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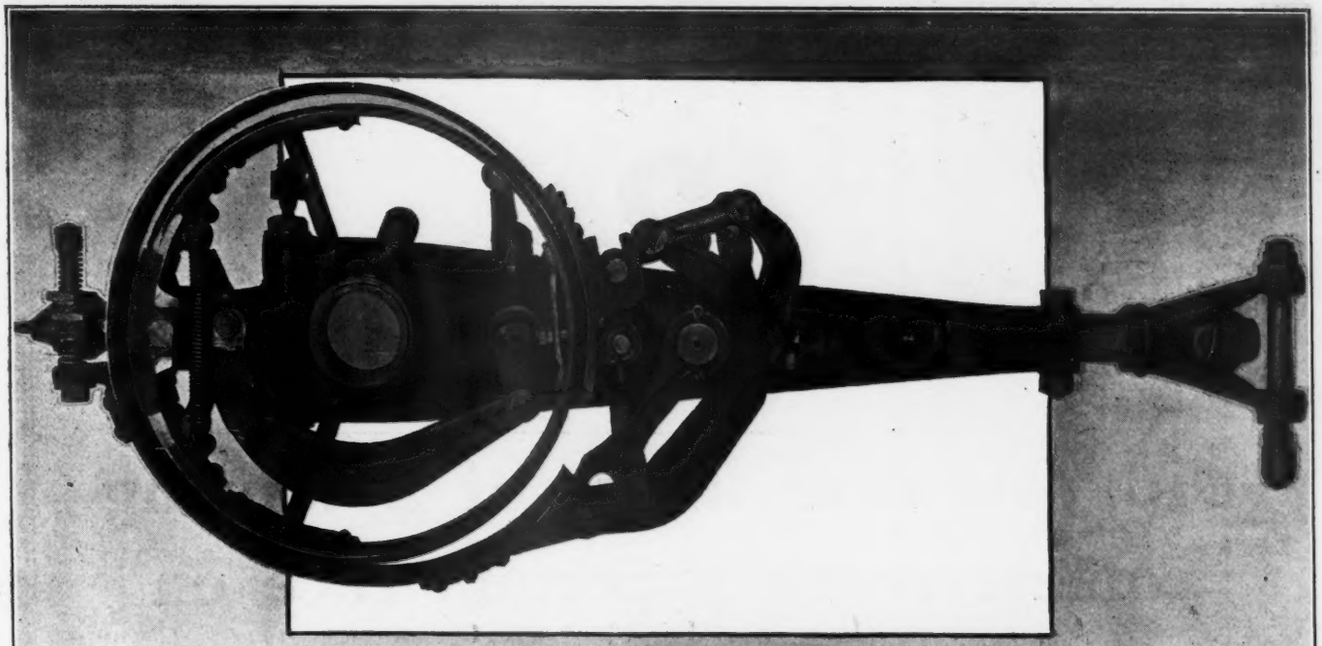

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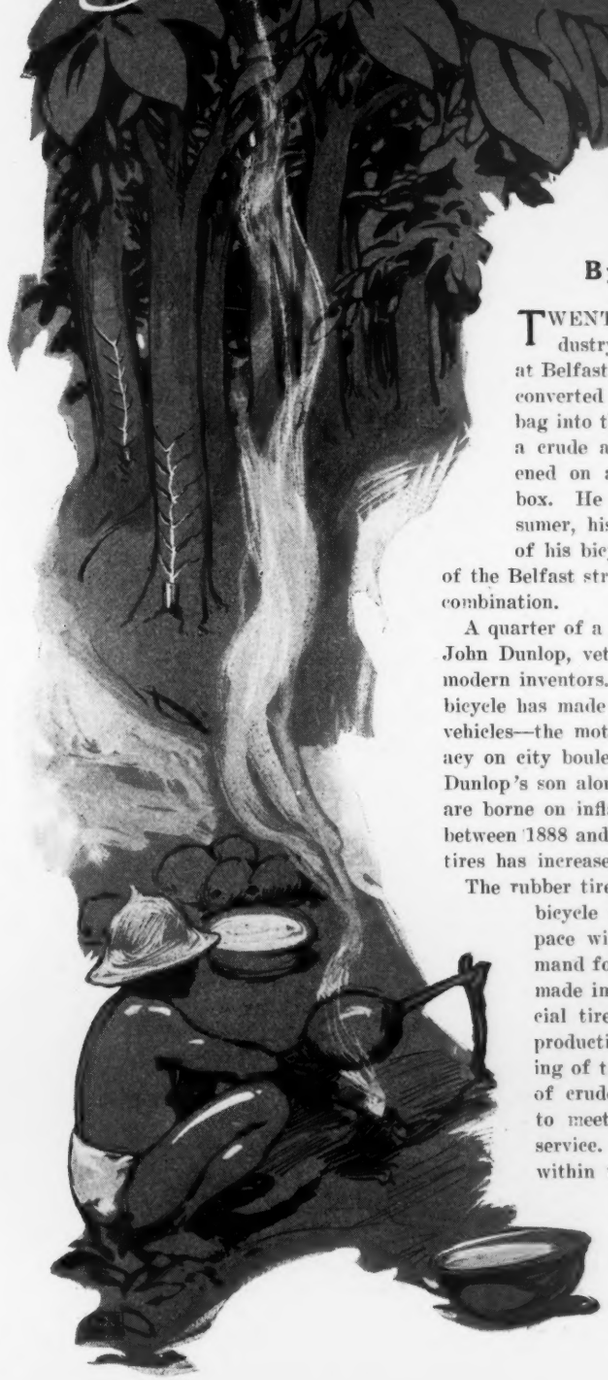
MOTOR AGE

From Para to Purchaser



By L. V. Spencer

TWENTY-FIVE years ago a colossal industry was born in a veterinary shop at Belfast, Ireland. There John B. Dunlop converted a sheet of rubber and a canvas bag into the first pneumatic tire ever made, a crude and primitive casing which fastened on a rim cut from a round cheese box. He manufactured for a single consumer, his son, who found the hard tires of his bicycle and the harder cobblestones of the Belfast streets a spine-jolting, bone-shaking combination.

A quarter of a fleeting century has elapsed since John Dunlop, veterinary, joined the ranks of the modern inventors. In the 25 years since 1888, the bicycle has made its bow and the autocrat of all vehicles—the motor car—has sounded its supremacy on city boulevard and rural highway. Where Dunlop's son alone rode on air in 1888, thousands are borne on inflated tires today. In the interim between 1888 and 1913, the demand for pneumatic tires has increased 10,000,000 times or more.

The rubber tire factories, first erected when the bicycle was perfected, have had to keep pace with the motor industry. The demand for thousands of tires each day has made imperative the development of special tire-making machinery for quantity production, special processes for the saving of time and labor, special compounds of crude rubber and chemicals in order to meet the exacting conditions of tire service. All this has been accomplished within the short space of 10 years. A canvas bag and a sheet of thin rubber no longer are adequate to meet the demand. A city of the size of Akron had to grow and replace the veterinary shop as the center of production.

Rubber biscuits in storage as received at the Goodrich factory. These are kept in cool, dark rooms until needed

Washed rubber sheets hung up for air drying at the Goodrich company's factory in Akron, O.

It would be to the advantage of every motorist to visit some of the great tire-making plants and to see for himself just how many and how intricate are the processes required to produce the very perfect pneumatic to which he often gives so little consideration. No doubt there are many motorists who are of the opinion that in some mysterious way the molten rubber is poured into the tire mold and allowed to congeal, in much the same manner as a metal casting is made. Compared with the actual process of manufacture, this would be an easy method indeed.

The dependible motor car tire demands the best grades of rubber obtainable in its make-up. Such grades generally come from the Amazon regions of South America and are known to the rubber trade as Paras, the name coming from the fact that the rubber usually is marketed through the port of Para. Up-river Para is the finest rubber. It is gathered among the upper waters of the great Amazon from trees, the botanical name of which is Hevea Brasiliensis.

Indian Labor Employed

The Indians of South America are about the only human beings who can withstand the extremely unhealthy climate of the equatorial zone long enough to gather the rubber, hence this class of labor is used almost exclusively. Contractors lease large tracts of land on which are several hundreds of Hevea trees and fit out gangs of these Indians to go into the jungles to gather the sap or juice.

The natives use narrow hatchets to cut B-shaped grooves in the bark in herringbone appearance around the tree trunks, joining them by a main cut running vertically. At the bottom of these main grooves little tin cups are fastened and the juice flows from all the cuts down through these main channels to the cups.

The filled cups are later gathered and taken to the camp where the juice is coagulated by the smoke from a palm-nut fire. Flat wooden paddles are dipped alternately into vessels of the juice and rotated over the fire, this hardening the gum and acting as a preservative. Thus the thin gum is slowly wound on the paddles, the hardened balls increasing in size with each turn until a sufficient diameter has been reached. These large balls of rubber are called biscuits and are cut in two in order to remove the paddles, after which they are ready for shipment.

Raw Stock Reaches Plant

Arriving at the rubber factory, the biscuits go first to the inspection room, where the expert rubber man examines them and rejects any not up to the standard. This crude stock is next sent to cool, dark storage rooms where it remains until needed.

From the storage room, the biscuits go to the wash room, where they are cut up into small chunks and placed in large vats of warm water to be softened preparatory to working by machinery. Having remained in the vat long enough, the rubber is put through a machine called a cracker, which breaks it into spongy sheets. The cracker has two large rolls, gear-driven at different speeds and which have on their surfaces pyramid projections. The rolls revolve close together and as the chunks of rubber pass between them they are literally mashed down by the combined rolling and pulling action of the rough cylinders. Water plays over the spongy sheets as they are being worked, washing away all foreign matter, such as pieces of bark, sand and other dirt. The rubber is rolled through the cracker until it has reached a uniform condition.

Green stock room at Firestone plant. Mixed rubber cut from the rolls of the mixers and rolled up ready for further working

Next it goes to the washing machine, which is somewhat larger than the beater, but similar in construction, having two large rolls. These have long grooves in their surfaces instead of the pyramids, and thus their action is not so severe. In this machine, the spongy mass is rolled into thinner and more uniform sheets, the rubber passing through the rolls a number of times until the inspectors are satisfied that all foreign matter which was not taken out by the cracker is removed. Water also plays over the rubber in this machine as in the cracker.

The Drying Process

An important step in the manufacture of the rubber stock is the drying process, which comes next. If the stock is not thoroughly dry, the particles of moisture form steam when vulcanized and blisters result. Some grades of gum are dried in artificial vacuum driers, but the better kinds, such as that needed in tires, are allowed to dry naturally. The sheets coming from the washing machines are hung on poles in aisles in drying rooms so that air may circulate freely around them. The temperature varies from 90 to 105 degrees, and the stock is usually permitted to stay in these rooms for from a month to 6 weeks.

Following the drying process, the pure gum stock must be mixed with various chemical ingredients so as to give it the desired physical properties, such as toughness, stiffness, and so on, for the particular purpose for which it is to be used. Other chemicals are added to give the rubber different colors. Antimony sulphide makes it red;

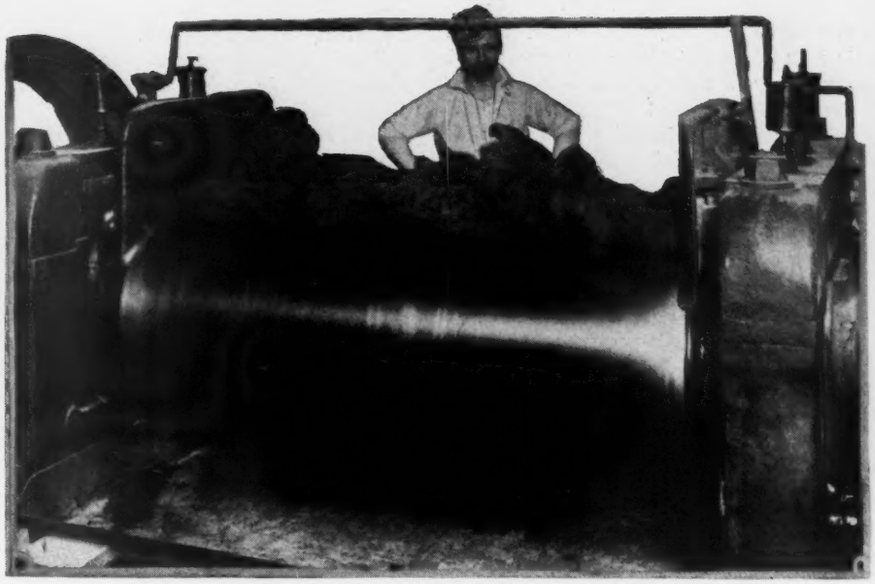
litharge makes it black. Both of these also serve as preservatives against oxidation. A certain amount of sulphur is also compounded with the rubber so that it will vulcanize, for vulcanization is really merely the heating of physical combinations of sulphur and rubber until they form chemical compounds.

Coming from the drying room, the rubber is carried to the mixing room, where these chemical ingredients are weighed out with the proper proportions of rubber and placed in trays ready for the actual mixing process. The whole then is conveyed to the mill room, where there is a battery of machines for combining the rubber and the chemicals into a pasty mass of even consistency, which is the characteristic form of the green stock.

Viewing the Mixing Mills

The mixing mills look like the crackers and washers, in that each has two heavy rolls. These mixers are much heavier, however, and the rolls run closer together. Their surfaces are smooth, while pipe connections to the insides of the rolls for the admission of steam and cold water make it possible to keep the rolls at any desired temperature for mixing.

The dried rubber is first put into the mill and worked until it has become very sticky and plastic and uniform throughout. It is rolled between the two cylinders time and time again and when it has arrived at a certain degree of pastiness, the chemicals are thrown in a little at a time, according as they are taken up by the mass. The rolling and kneading process continues until the newly-added ingredients are uniformly mixed throughout the stock. The condition of the pasty mass soon becomes such that it forms completely around one of the big rolls, and thus feeds continually between it and the other roll. The operator aids in the uniform mixing by cutting the rolling mass from the cylinder with a knife as it revolves, doubling it up and putting it between the two rolls again and again.



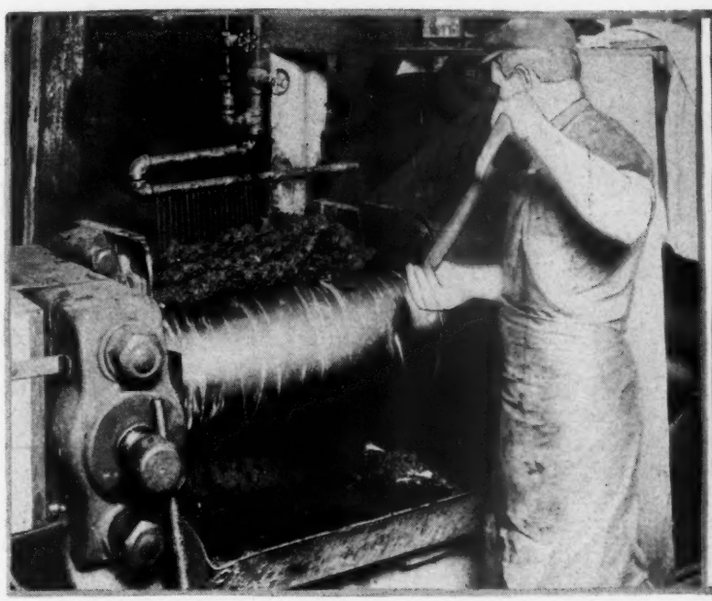
Firestone mixing mills in which the dried stock is kneaded into a pasty mass and mixed with chemicals to give it the desired physical properties

Finally the inspector passes upon the batch as being properly mixed, when it is cut off the rolls in large sheets about ⅜ inch thick. Talc or soapstone is sprinkled over these to prevent them from sticking together, after which each sheet is rolled up and sent to the green stock room. Here there are bins or shelves for the receiving of the various compounded rubbers until the different departments are ready for them. The stock is usually allowed to season or age here for a given time before use.

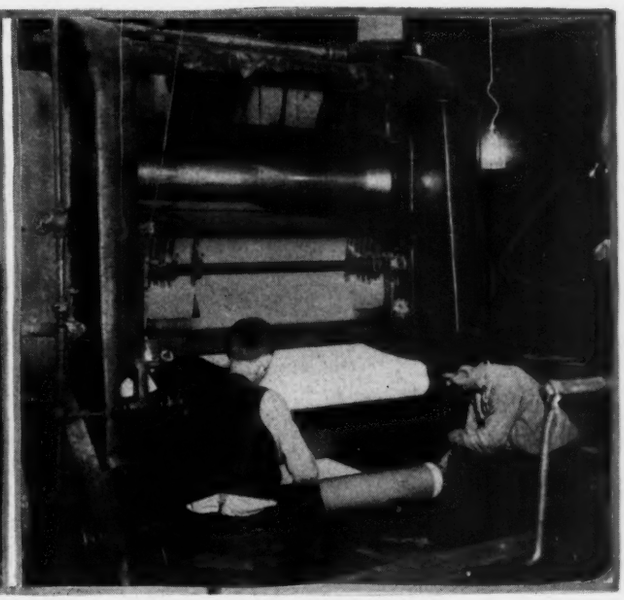
Molded goods, such as rubber heels, solid tires of all kinds, some forms of hose, and so on, are made from the stock as it comes from the green stock room, but various other uses require that it be first sheeted out or spread into fabric before it is used. Among these latter may be mentioned pneumatic tires, rubber clothing, boots and shoes, many druggists' sundries, etc.

In the Calender Department

Accordingly, the green rubber which is chemically mixed as we already have seen, must next go to the calender department, where are to be found the largest machines in the whole rubber plant. For sheeting out the stock and calendering it, huge rubber calenders are employed, which are built with three or four heavy rolls. The distance between these rolls may be very closely adjusted so that the sheets may be made any desired thickness. Like the mills, these rolls are provided with steam and water connections for temperature regulation.



Breaking down the chunks of rubber into a spongy mass in a "cracker" at the Republic plant. Water plays over the rubber during the operation to wash out dirt



Rolling the green stock into thin sheets in a calender at Swinehart plant. The rubber is rolled up in cloth liners to prevent sticking

The green stock is fed between the rolls and comes out the opposite side, where it is rolled into cloth liner to prevent sticking. Very thin sheets for inner tube stock are sometimes rolled out, while the same calender also may be employed for turning out heavier material, such as that used in the making of treads for tires. Liner cloths are ever present, and the rubber and cloth are always rolled up together preparatory to transfer to whichever department is to receive the material.

Selecting the Fabric

One of the most important parts of the motor car tire is the fabric, the several layers of which form the body of the casing. Extreme care is taken in its preparation for this use, for any weak strands, wet spots or uneven weave would tend to make the tire weak wherever these imperfections came. The fabric really is the backbone of the tire.

Coming from the knitting mills, the fabric must undergo rigid inspection at the tire factory before it will be accepted for use in building tires. For example, one method of fabric inspection is to pass it over a panel of frosted glass back of which there are several electric lights. Any thin spots, unevenness or other imperfection is thus easily detected by the transparency of the fabric as it passes over the lighted glass. Reports of each roll as received are made out and sent with a sample of the fabric to the laboratory, where a tensile strength test is made and weight of the material is noted. It must meet specifications in this as in other respects.

Having been carefully inspected, the fabric next must be freed of any possible moisture. There are several ways of doing this, the most common being to pass it over the large heated iron rolls of an ironing machine, so called. This procedure thoroughly dries the fabric and gives it the finishing touch before it is impregnated with rubber.

Another method of insuring the positive dryness of the cloth used by one of the big factories, at least. A long bank of steam coils is utilized, the fabric wending its way between each set of coils of pipe, entering the battery at one end and passing alternately up and down until it emerges from the coils at the opposite end. Thus the same result is accomplished as with the ironing rolls.

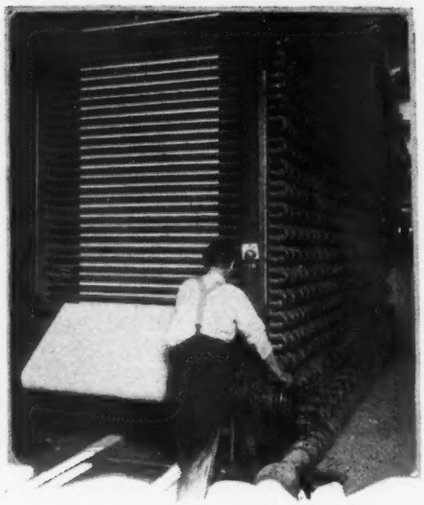
After all of this careful preparation, the fabric is ready for the friction or rubber impregnating process. This is done in the calenders, the rubber being literally forced into the weave of the cloth. The green compounded stock is placed between the top and middle rolls of the big machine, and, rolling through, passes around the middle roll. The dried fabric is passed between the middle and bottom rolls and the rubber coming around the middle roll is thus forced into it, the now rubberized fabric rolling out between the middle and bottom rolls and into liner cloths just as the pure rubber sheets are rolled up. This frictioned fabric is now ready for the tire building department.

Up to this time the visitor to the tire factory has seen nothing pertaining to the actual building up of the tires themselves, although he has watched the preparation of the various thicknesses and grades of stock and the frictioning of the fabric.

Actual Construction

These materials come to the tire department proper in large rolls in the cloth liners. The rubberized fabric first must be cut into strips wide enough to pass over the crown of the tire and to extend to the beads on either side. These strips always are cut on the bias at an angle of about 45 degrees so that the strands of the fabric will be at a tangent and be on the line of strain when the wheel is driving or is caused to resist the forward motion as in braking. The strips are sometimes cut by hand, the fabric being pulled out from the roll onto a long table and two men each cutting half way across along a straight edge set at 45 degrees.

But machine cutting has stepped in to replace hand cutting of the strips, and in many of the plants modern bias cutters are used. This bias cutting machine has a knife set at an angle of 45 degrees and is provided with a set of jaws which pull the fabric under the knife. The latter descends when the limit of motion of the jaws is reached at the set width and cuts off the strip, which falls on a conveyor belt and is carried to the end of the table, where it is placed between two of the cloth leaves of a "book" and together with a number of other strips taken to the splicers. The cutting machines save much time, as they can cut about eighty strips per minute.

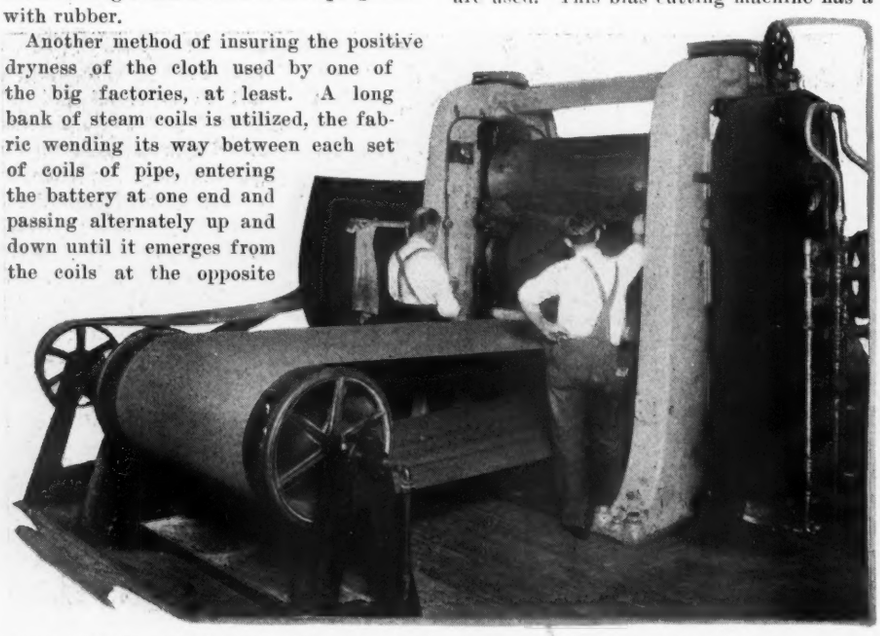


Large bank of steam coils over which fabric passes to eliminate any moisture at the Republic plant

Splicing the Strips

The strips next must be spliced end to end so that there will be sufficient length to extend around the tire, according to the diameter desired, and leave enough length for joining the two ends. The ends of the strips lap ½ inch and it is an easy matter to make them stick by simply rolling down with small hand rollers, the gum in the weave adhering very readily without the application of outside agents.

Two methods of building up the plies over the iron core are employed, it being done either by the hand process or by the use of a tire-building machine. Where the hand method is in vogue, the necessary number of spliced strips for the particular size and kind of tire to be made are laid up in cloths in a book and sent to the tire builder. An iron core having the shape of a tire is mounted on a building stand and a coat of cement is usually applied to it so that the fabric will stick in place when applied. The first strip then is stretched over the cemented core and the ends spliced together. It is rolled down evenly around the core with a hand roller until it clings perfectly smooth over the crown and at the base. The uneven edges at the base are trimmed off, after which succeeding plies are put on, one over the other, in the same way, care being taken that no two splices come at the same point to weaken the carcass. The number of layers of fabric depends upon the size of the tire, and after about half of them have



Frictioning the fabric at the Republic works. The green rubber literally is forced into the weave of the cloth

been carefully put on, the beads are inserted, the fabric being rolled down around them, fixing them securely in place. These beads are made up in hoops of triangular cross section or other shape dependent upon the tire design and are composed of built-up rubber fabric.

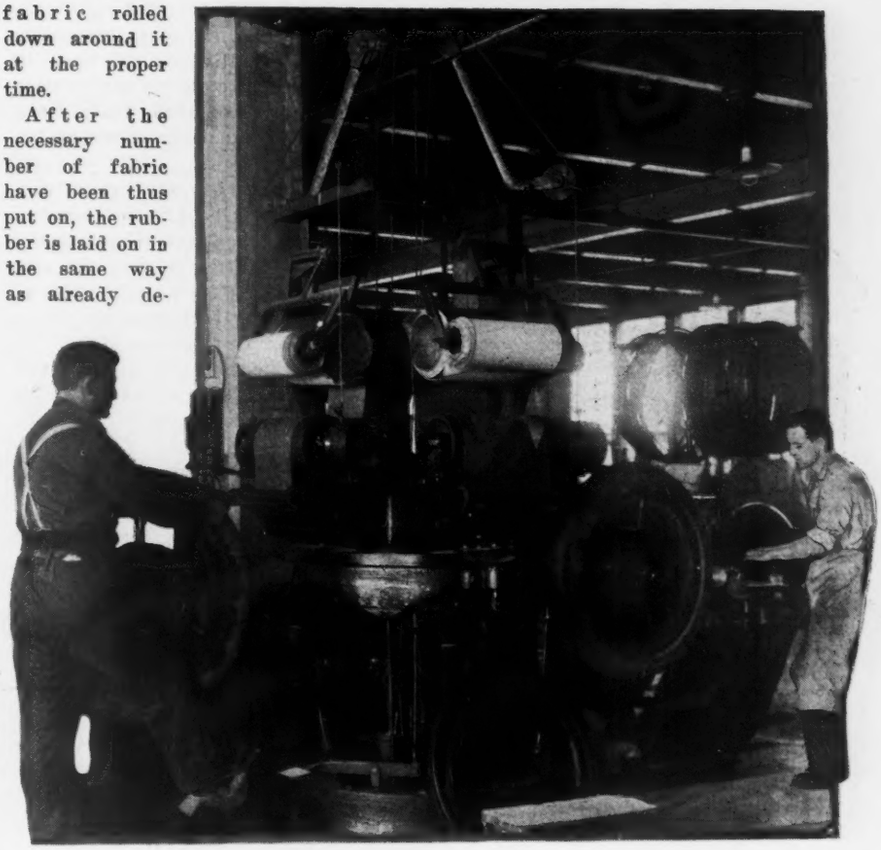
The tire builder next adds the cover rubber, which is thinly rolled stock of special composition having a thickness of about $\frac{1}{8}$ inch. The stock comes to the tire builder in the form of narrow strips about 6 inches wide and is rolled onto the partly-built tire over the fabric. Strips are evenly laid on and their edges lapped in the same way as the fabric is applied.

Putting on the Tread

Having completely covered up the fabric with this rubber, the tire builder next puts on the tread, which is a thick built-up strip of rubber of a composition possessing wear-resisting qualities, toughness, and the like. The tread is made up before it comes to the tire maker, the process being merely the laying on top of one another of a series of narrow strips of the tread stock of varying widths until the proper thickness is reached. The widest strip is at the bottom and each succeeding one is narrower, making a pyramid construction with the center much thicker than the edges. In laying the tread onto the tire the small hand rollers are again used to firmly and smoothly roll it down.

Machine-built tires have the same resulting construction as the hand-made ones, the only difference being that the layers of fabric are put on by machines instead of by hand. The spliced bias strips coming from the bias cutter are rolled up on a spindle instead of being placed in a book, and the spindle placed in the machine. The tire form or core is mounted on a stand which is a part of the machine, and is rotated slowly by power, while the fabric is rolled onto the form from the spindle under a fixed tension. It is rolled down smoothly around the crown and the edges by little rollers on the machine, power-driven. The bead is put in and the fabric rolled down around it at the proper time.

After the necessary number of fabric have been thus put on, the rubber is laid on in the same way as already described for the hand-built tires. No machine has yet been perfected for properly applying the pure rubber over the fabric.



Machine used by Goodyear to build up the layers of fabric. The cloth is rolled from the machine onto the core

The tire is thus completely built and is ready for the curing or vulcanization process. It must now go to the pits where are located huge steam heaters which look like large vertical boilers. The tires are placed in large iron molds, core and all, the two halves of these molds being pressed together by hydraulic pressure. About a dozen of these molds are placed in the heater, one on top of the other, the lower one resting on a table which can be raised or lowered to allow the heavy molds to be piled on, lowering it the height of the mold to bring the pile flush with the loading table after each succeeding mold has been added, or raising it to take them out, as the case may be.

Curing the Tires

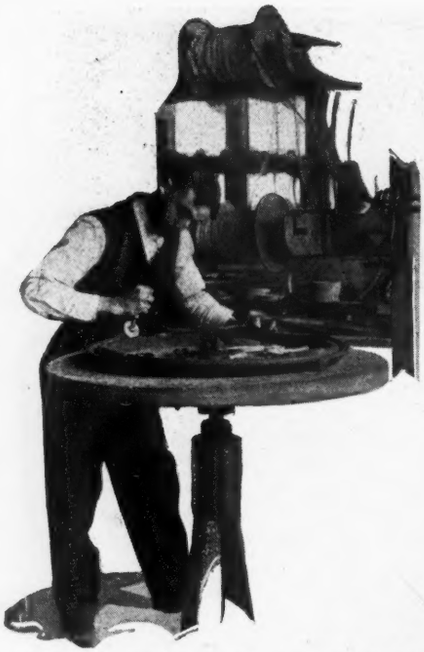
The several molds being in the heater, the heavy cover is locked on and the table forced up against the lid by hydraulic pressure, thus pressing all of the molds together. The steam is turned on and the tires allowed to cure for about 3 hours at a temperature of about 300 degrees.

The vulcanization over, the molds are removed, cured tires taken out and cores dispensed with. The insides of the casings are next painted with a kind of talc and asbestos paint to prevent the inner tube sticking and heating. The tires are cleaned, and rinds formed around the crown where the halves of the mold came together are trimmed off. They are finally inspected and wrapped or otherwise prepared for market.

The single-cure process has been outlined above. Many tires are made by the double-cure or wrapped-tread method, which involves two vulcanizations instead of the single heating. After the cover rubber has all been applied as we have seen, and before the tread is put on, the tires go to the curing room, where they are placed in molds and heated the same way as are the single cured tires. But the vulcanization is only a partial one, for the

Bias cutting machine for cutting the rubberized fabric into strips to go around the tire at the Goodrich plant

Building up the layers of fabric on the iron core by the hand method at the Republic plant



Making the beads in mold at the Goodyear works

nearly finished tires are allowed to remain in the heaters only about half as long as in the single-cure method.

The partly cured tires then return from the vulcanizers with the cores still in place and are next mounted on buffing stands and that portion of the rubber cover which is to be under the tread is roughened, so that, with the aid of one or more coats of cement, the tread, which is now applied, will stick. This is positioned and rolled down. The tire now has a green-rubber tread and a partially-cured carcass.

Another Steam "Cooking"

Narrow strips or ribbons of cloth are then wound around the tire and its core, covering it completely. Cross-wrapping machines are sometimes used for this purpose, or the wrapping is done by hand. In this condition the tires are hung within horizontal cylindrical heaters and subjected to another steam "cooking." This heat is so timed that the carcass will complete its cure and the tread receive its entire vulcanization at the same time. To do this, the tread stock must necessarily be of a quicker curing compound.

No pressure is applied to the tires during this second heating, and after about 1½ hour at a temperature of 285 degrees or more, the tire is cured. On removal from the heater, the wrapping cloth is taken off, the core removed and the completed tire cleaned and made ready for market.

There also is a single-cure wrapped-tread process, but this is little used. It consists essentially of building the tire up over a core in the usual way, fastening metal side flanges outside and over the cover rubber up to the tread, wrapping the whole and curing. Then there are several modifications of the two principal methods described, but we have seen the procedure as practiced in the average big tire plant.

As compared with the making of the tires proper, the tube manufacturing process is a comparatively simple one. In general there are three ways of constructing tubes, which give rise to the trade designations of rolled, seamed or tube-machine-made varieties.

By the first method, wide sheets of thin rubber stock as turned out by the calenders are rolled around iron mandrels of proper cross-sectional diameter to give the size of tube wanted. After enough plies of this thin stock have been smoothly rolled up to give the proper thickness to the tube rubber, the long edge is rolled down, and the whole is wrapped in a piece of damp cloth. Then a long ribbon of narrow cloth is spirally-wrapped cross-wise around this, protecting the whole from the direct action of the steam in the vulcanizer.

Tread laying at the Republic factory. The widest strip is put at the bottom and each succeeding one is narrower, making a pyramid construction when completed

A large number of these wrapped tubes are placed on a carrier and the whole shoved within a horizontal cylindrical heater; the cover is put in place and the load of tubes cured.

Steps in Tube Making

Coming from this vulcanizer, the tubes are unwrapped, taken off the mandrels and turned inside out so that the rough surface which was next to the cloths is inside and the smooth part which was in contact with the smooth iron rod is outside.

Next the valve hole is punched and the valve and stem put in place. The ends of the tube must be joined, the procedure being simply to buff down the rubber so that when the edges are lapped there will be a smooth joint, after which they are spliced with a cement which contains an acid for curing. Special clamps are used and forms inserted so as to insure an even pressure around the splice as it is being cemented. This takes about 20 minutes.

The tubes are then tested against air leaks, marked with the size and boxed for shipment.

Seamed tubes are made of a single thickness of rubber, which is usually about $\frac{1}{16}$ inch thick. This comes in strips which are wide enough to form the desired tube diameter when the long edges are folded over. These edges are first beveled so as to make a smooth seam, after which they are joined with cement and rolled down with hand rollers.

The seamed tube thus made is pulled over an iron mandrel similar to that used with the rolled tube. Compressed air aids in putting the tubes on. They are blown up so as to be larger in diameter than the mandrels, when it is an easy matter to slip them on.

The cloth wrapping, vulcanization and finishing of tubes made in this way are the same as already described for the rolled variety.

Partially-built tire being placed in mold for first cure. Double-cure process as used at Swinehart plant

National Postoffice Buys Trucks

Uncle Sam Trying New System

WASHINGTON, D. C., Sept. 20—Postmaster General Burleson stated today that forty-one motor trucks have been purchased by the postoffice department. This is the first time that the use of such vehicles in the postal service has not been secured by contract or hire and officers of the department, as well as manufacturers, are keenly interested in the outcome of the experiment.

Twenty of these trucks will be furnished by the White Co., of Cleveland, O., at a cost of $2,060 each. They will be of 1,500 pounds capacity. They have been designed and constructed especially for the needs of the new parcel post in cities. The carriage, trays and hampers are made with a view to carrying the maximum amount of merchandise mail.

In addition to delivering parcels the trucks will be used in the regular collection service. The postmasters at Baltimore, Brooklyn, Buffalo, Louisville, Minneapolis and Philadelphia will each receive some of the heavy trucks, which are to be first delivered and will be expected to keep a careful record of the cost of operation and maintenance. These results will be returned to the department and carefully compiled. After charging the purchased cars a proper amount for depreciation and insurance, the total cost for a certain period of time will be compared with the rental paid for twenty similar machines for the same period.

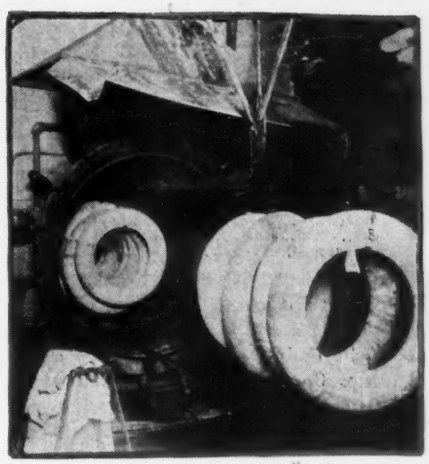
The other twenty-one trucks are lighter machines of smaller capacity for use in small cities and to provide a supplementary service in the large cities that can be used to advantage when the volume of mail for any delivery does not necessitate the use of a heavy truck. They will be furnished the Wagenhalls Motor Truck Co., of Detroit, at a cost of $625 each and will be of 600 pounds capacity.

One of the White trucks was recently inspected by Postmaster General Burleson and First Assistant Postmaster General Roper, who are making a special effort to solve the problem of efficient and economical delivery of parcel post mail. They expressed themselves well pleased with the machine and declared that if these trucks in operation were found to cost the department less than the contract trucks doing the same work they would be inclined to favor the further purchase of motor cars to be used under the same conditions as these in the city delivery of parcels.

On October 1, at 2 o'clock, the purchasing agent of the postoffice department will receive sealed proposals for furnishing a large quantity of motor vehicle supplies as they may be required during the year ending June 30, 1914. Intending bidders can secure specifications and blank proposals upon application to Acting Postmaster General D. C. Roper. Among the articles required are nonskid tire grips, gasoline, machine bolts, grease, bulb horns, brake lining, cylinder oil, blowout patches, spark plugs, pneumatic and cushion tires, inner tubes, etc. The supplies are to be used to equip and repair the twenty-one Wagenhalls and twenty White trucks soon to be installed in various cities.

Machine for wrapping finished tires in paper for shipment at the Republic. The paper carrier revolves around the tire, which is also made to turn slowly around

Affixing the tread with a hand roller at Firestone's



A number of tires built up and wrapped in cloths preparatory to their final cure in the large steam vulcanizer seen in the background

TALKS ON STEEL TREATMENT

Detroit, Mich., Sept. 20—A talk of unusual merit was given by R. R. Abbott, of the Peerless Motor Car Co., before the Detroit Engineering Society last night, the subject being the heat treatment of steel. Although the same proportion of the various microscopic structures may be obtained approximately alike in two samples of the same steel, by different heat treatments, the physical properties will vary markedly. Therefore it is the problem of the metallurgist to scientifically determine the heat treatments to properly bring out the physical characteristics that are desired, said Mr. Abbott.

The breaking up of coarse crystalline and blotchy structures by means of heat treating was clearly shown by a number of microphotographs. Mr. Abbott touched briefly upon the methods of measuring heat and of investigating the critical temperatures of steels, and then took up the interpretation of physical tests. He illustrated that the reduction of area at the point of rupture of a tensile test piece was the correct measure of the toughness rather than the elongation in a certain length, which is often held to indicate this important physical property.

A rather widespread belief that alloy steels are stiffer than ordinary steels was branded as a fallacy by the speaker. There is no difference in the deflection of two such steels, for the same load of the elastic limit of neither is not passed. It is not intended that such condition shall take place in a crankshaft, and the use of alloy steel in such places is for its greater strength and not for greater rigidity.

TRADE-BOOSTING TOUR ENDED

Kansas City, Mo., Sept. 22—The annual trade-winning and good roads boosting motor tour of the Kansas City Automobile Dealers' Association yesterday completed its 548-mile jaunt through seventeen counties of north Missouri. Twenty-two cars made the trip, carrying sixty-nine persons, including Colonel Frank W. Buffum, state highway commissioner, who made road talks in each of the twenty-six towns where stops were made. The last half of the run was made through almost impassable mund, but none of the cars—a test for the new 1914 models—failed to make the entire distance almost on schedule time. This trip had been well advertised in advance and the results attained were most satisfactory to the dealers who participated in the journey.

Coupe de l'Auto Road Race Captured by Georges Boillot

Peugeot Victory Winds Up European Season

Pos.	Car and driver	Time	M. P. H.
1	Peugeot, Boillot	6:07:40	63.25
2	Peugeot, Goux	6:16:03	61.31
3	Sunbeam, Guinness	6:18:50	61.28
4	Vauxhall, Hancock	6:58:18	55.51
5	Peugeot, Rigal	6:59:44	55.03
6	Alda, Tabuteau	7:52:34	49.13
7	Anasagasti, Avary	8:07:25	47.64

PARIS, Sept. 21—Special cablegram—Just to celebrate a triumphant season on road and hill and to clinch beyond all doubt their claims to the 1913 championship, Georges Boillot and the victorious Peugeot that won the grand prix and the Ventoux hill-climb earlier in the year, took the Coupe de l'Auto at Boulogne this afternoon, the final long-distance event of the season.

The speed finale of the year was a double victory for the Peugeot as Jules Goux trailed Boillot over the wire for second place. G. Lee Guinness, in the Sunbeam was third.

A total distance of 387 miles, or twelve laps of a 32¼-mile course, was covered by Boillot in his victorious drive. His time was 6 hours, 7 minutes, 40 seconds, an average speed of 63.25 miles an hour. The dean of the Peugeot team went to the front on the seventh lap and after that never was in danger of being defeated.

Seventeen cars, out of twenty-six entered, were sent away, the Delage, Schneider and Koecklin entries being scratched several days before. Goux set the pace on the first lap which he turned in 31 minutes, 2 seconds. He gave way to Boillot the next time around but again went to the front on the third circuit, a position he held until the seventh lap.

The seventh lap was unfortunate for the 500-mile race winner. He lost the top of his float chamber. Boillot and Guinness both passed him as he was at the pits.

When on the road once more, Goux started to chase Guinness and for five laps pursued the Englishman. Goux's driving was spectacular. He gradually crept up on the Sunbeam pilot, passed him on the eleventh lap, which he drove in 29:33, and maintained second place on the last circuit by breaking the course record. He drove the twelfth lap in 29:17.

Rigal, driving a Peugeot for the first time, lost 3 minutes at the start because his clutch slipped. He drove like a demon, however, and did not stop until 2 miles from the winning point when his throttle control went adrift. The time spent in repairing this damage cost him fourth place.

Resta, in a Sunbeam, missed a turn early in the race and overturned. Chassagne in the third Sunbeam, abandoned the race on the sixth lap when he was running in fourth place, a brake seizing and locking the wheel. Weston's Vauxhall overheated on the last lap and was withdrawn.

America was represented by two Buicks but neither finished. One, driven by Druillet, skidded on the second lap and injured a spectator severely, while the other American car, tooled by Repusseau, cracked a cylinder on the fourth lap.

The race was open to cars with a cylinder capacity of not more than 183 cubic inches and weighing not more than 1,984 pounds with tanks empty. Very varied road conditions, including a number of grades, were encountered by the drivers.

EARLY SPEEDWAY ENTRIES

Indianapolis, Ind., Sept. 24—Special telegram—Three entries for the next 500-mile speedway race already have been filed, the Stutz company naming two, while the Anel has been entered by W. M. Thompson, of Battle Creek, Mich. E. C. Patterson, of Chicago, announces he will again enter Pilette, probably in a Mercedes.

MICHIGAN FAIR RACE RESULTS

Detroit, Mich., Sept. 22—That Detroiters would support a motor speedway was evidenced again this year by the unexpectedly large crowd of race fans who braved yesterday's chill and cloudiness to witness the motor races which were a part of the Michigan state fair held here last week.

Fully 10,000 people were on hand to see Barney Oldfield, Louis Disbrow, Eddie Hearne and other race stars perform on the dirt track. The course was none too dry on Sunday, but the drivers managed to make some speed. Oldfield, in a Christie front-drive, clipped 52 seconds from the state fair dirt track record for a mile with a flying start, while Disbrow in a Simplex drove to a new record for 5 miles on a dirt track in a free-for-all. He made the distance in 4 minutes 24.25 seconds. Oldfield's time for the mile was 49.48 seconds.

Disbrow negotiated the mile in the second best time, making it in :50.80 and :50.86. None of the other drivers succeeded in bettering 52 seconds in these time trials. Disbrow made the best time in the two heats of the 5-mile race for class E cars, going the distance in 4:38.46 and 4:33.61 in his Simplex.

It is stated that the best previous time for a 5-mile free-for-all on a dirt track was made by de Palma at St. Paul when he went the distance in 4:29. Heineman in a Case was second in this event, while Hearne, also driving a Case, was third. In this race, which was the best of the day, Chandler ran into the fence, but was uninjured.

A novelty race, in which the cars were required to run 2 miles, change a tire and then go another mile, went to Hearne in 3:31.11. The Jay-Eye-See was on hand, and in it Disbrow was unsuccessful in his attempt to lower the state fair track record of 1:45⅘ for 2 miles, doing it in 1:48. Chandler, in a Mason, won the 10-mile event in slow time, while a class C event for non-stock cars went to Rickenbacher in a Mason.

PASS DRASTIC SIGN-BOARD LAW

Milwaukee, Wis., Sept. 22—Sign-boarding of public highways, the absence of which has made Wisconsin almost as notorious as the poor condition of the highways before the state provided financial assistance to townships and counties for permanent road improvement, is about to be prosecuted with vigor as the result of the passage of a strict law by the last Wisconsin legislature. The statute makes it mandatory that townships erect suitable and appropriate guideboards on and along all main traveled highways within their respective towns before December 1, 1913.

While there have been guide-board laws on the books for years, none has ever made it strictly mandatory nor fixed a penalty upon town boards failing to erect signs.

The new law, passed at the instance of the Wisconsin State Automobile Association, also fixes a penalty upon persons who deface signboards, the fine being from $10 to $25. Section 3 of the new law says: "There shall be painted upon such boards in plain black Roman letters not less than 2½ inches high, the names of adjoining or adjacent towns, villages or cities to and through which said public highway leads; the distance in miles of such town, village or city from such guidepost, and any indications which will be helpful to the traveler."

With the remarkable growth of the highway movement, which has resulted in the construction of hundreds of miles of permanent roadway in the last 2 years, the need of guideposts has become more and more apparent, and the motor clubs throughout the state intend to enforce compliance with the new statute at the earliest opportunity.

HOLDS SPEED LAW INVALID

Indianapolis, Ind., Sept. 22—A rather unique, but interesting decision, has been handed down by Judge J. M. Rawley, of a county court at Brazil, Ind. He has held that because the preamble of the Indiana law regulating the speed of motor cars does not definitely define a criminal act, the entire speed law, including the specific rates of speed at which motor cars may travel, is invalid. The preamble provides that motor vehicles shall not be driven on any public highway "at a speed greater than is reasonable or prudent, having regard to the traffic and the

use of the way so as to endanger the life or limb or injure the property of any person." He holds the words "prudent" and "reasonable" do not define a criminal act. The question has not been raised in any other Indiana county.

SAFETY CAMPAIGN BEARS FRUIT

Milwaukee, Wis., Sept. 22—Several fatal accidents in which motor cars were leading figures, and a marked increase in arrests for speeding, 2 weeks ago threw Milwaukee into a furore of excitement and caused the Milwaukee Automobile Club to organize a vigorous safety campaign, which at this time has had splendid effect and resulted in cutting down the arrests for speeding and reckless driving to the lowest point in 3 years. Instead of waiting for public sentiment to grow too strong, the club organized a committee of ten on public safety, which is carrying on a campaign in the public press. As the basis of the campaign, the club framed ten safety commandments, as follows:

Healthy and vigorous enforcement of all laws, rules and regulations on motor cars, team and pedestrian traffic without fear, favor or bias.

Careful study of laws, ordinances and rules by owners and drivers of motor vehicles, horse-drawn vehicles, and the pedestrian public.

Elimination of the "I dare you to kill me" attitude of pedestrians toward owners and drivers of motor cars.

Wholesale agitation through the public press against the reckless driver and speed demon.

Wholesale agitation through the same channel admonishing a careless pedestrian public to do its share.

More liberal co-operation between motorists and pedestrian, and interchange of courtesy rather than continued antagonism.

Instruction of children through the agency of public schools to avoid accidents.

Abolition of foolish and dangerous fad of carrying red and green, or "navigators' lights" on the front of motor cars.

Prohibiting the use of glaring headlights on motor cars within the city limits, or subduing the blinding glare by mechanical means.

Instilling into the mind of every man, woman and child "Safety First."

During the past week there were but three arrests for motor car speeding, as compared with an average of forty and fifty each week for several months this year. Observation of traffic shows the effect of the campaign.

BADGERS BUSY ROAD BUILDERS

Milwaukee, Wis., Sept. 22—Nearly twice as many miles of public highway has been permanently improved in Wisconsin this year as in 1912, according to the report of the Wisconsin state highway commission, now completing its labors for the year. Nothing illustrates the remarkable progress made by the state of Wisconsin in road improvement work under state aid as the following comparative figures:

Material	Constructed Mileage 1912	Constructed Mileage 1913
Concrete, 14 to 18 feet wide	10	26
Stone macadam	163	290
Gravel macadam	54	155
Shale, clay and other surfaces	18	65
Graded, but not surfaced.	223	460
Total	468	996

During the present year more than 200 bridges and culverts have been constructed under state aid.

The first work under the state aid law was done in 1912, the law having been passed in the middle of 1911. It was instantly popular, as the figures prove. While the prospects for 1914 permanent road work do not indicate that the amount of work will be double that of 1913, as was the case this year, the percentage of increase will be in excess of 50 per cent.

Milwaukee county, the largest county in the state from a standpoint of population, is leading in the construction of the actually permanent roads, with 20 miles of concrete highway. In 1912, Milwaukee county built 10 miles with this surface. At this rate, it will require not more than 5 years more to pave all main-traveled highways in Milwaukee county with concrete, although the original estimate was 10 years.

With Kenosha county having $100,000 available for permanent road work in 1914, and Racine county about $85,000, the prospect of a concrete road from Milwaukee to the Wisconsin state line, there meeting the Sheridan road, is exceedingly bright. If Sheridan road is put into good shape by the Illinois jurisdictions, there will be ready for traffic at the end of next year a splendid lake shore drive of 90 miles, connecting Milwaukee with the western metropolis. Racine and Kenosha counties will build concrete roads from northern to southern limits, connecting with the concrete roads built by Milwaukee county to its southern line.

To Dedicate Lincoln Way October 31

DETROIT, Mich., Sept. 22—With local celebrations from coast to coast all along the route of the Lincoln highway, on the night of Friday, October 31, the transcontinental thoroughfare will be dedicated to Abraham Lincoln. Programs are being arranged in every city, village, hamlet and crossroads either on or adjacent to the route between New York and San Francisco. The pathway through these cities and villages where the Lincoln highway soon will be a reality will be decorated with the stars and stripes, bunting and the official flag of the Lincoln Highway Association. There will be parades, the good old-fashioned torchlight processions, band concerts, motion pictures of good road building and many speeches. Local orators will tell about the urgent need for the Lincoln highway and paint the outlook in glowing colors.

Markers will also individualize the highway. It consists of a strip of red 3 inches wide, white 15 inches in width and a blue strip 3 inches wide, with a letter L in blue on the white section. The words "Lincoln Highway" in small type are also on the marker. The first of these markers was placed on Monday, September 15, at Clinton, Iowa, where W. F. Coan, president of the Clinton National bank and state consul for the Lincoln Highway Association, set one on the road near Clinton.

The following Sunday, November 2, pastors at each point, and of every religious denomination are to preach sermons on the character and achievements of Lincoln, his real patriotism, linking his name, his high ideals and purposes with the movement back of and actuating the building of this enduring and useful memorial to him.

State consuls are now being appointed along the route and in other states to arrange in the distribution of contributors' certificates for the $10,000,000 fund necessary to complete the Lincoln highway. Some named are Payson W. Spaulding, of Evanston, for Wyoming; E. P. Brinegar, chairman of the Lincoln highway committee of the San Francisco chamber of commerce, for California; H. O. Smith, president of the Premier company of Indianapolis, for Indiana; F. E. Edwards, of the Chicago Automobile Club, for northern Illinois; C. L. Newcomb, Jr., chairman of the Lincoln highway committee of the Denver chamber of commerce, for Colorado; W. F. Coan, president of the Clinton National bank, for Iowa, and H. E. Frederickson, of Omaha, for Nebraska.

WOLVERINES SEE NEW CARS

Detroit, Mich., Sept. 20—The Michigan state fair closed its doors for another year tonight and with it the motor car show came to an end. This show, which is held in a special show building, always is a sort of advance showing to the people of Michigan of some of the new models which will later be shown nationally at the big exhibitions at New York and Chicago.

As it is a dealer's proposition, not only the cars made in Michigan, but many of those produced outside of the state are exhibited. Twenty-six makes of passenger cars were represented this year, in addition to four makes of commercial vehicles. Half a dozen accessory concerns also exhibited. Among the newer cars to be shown were the 1914 Jackson models, the new Imperials, the Regals and the little six Oakland. The latter car is of the advanced streamline type and has 48 horsepower. While many of the other cars shown were very new and of the 1914 vintage, they have been announced previous to this show. The electric cars shown also revealed a new feature in the duplex drive, which consists of two sets of driving levers, so that the machines may be controlled either from the front or the rear seat. The Grinnell and Detroit electrics made here and the Ohio electric of Toledo were represented. The Ford Motor Co. showed interesting moving pictures of the making of Ford cars.

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Racing Reduced

WITH it now almost a certainty that the Vanderbilt and grand prize races on the Savannah course this year will be called off because of lack of entries, the motor car manufacturer has brought himself one step nearer to an inevitable condition that he has been consistently working for, perhaps unconsciously for the last 3 or 4 years.

DURING these years of maximum reduction he has determinedly kept away from contests of any nature. He did everything possible to stamp out stock-car contests which had done so much to eliminate the kinks from his product. He held aloof from non-stock events because of the fear of not cashing in in proportion to the money and effort expended. Today he is keeping away from practically all forms of contests so that the contest activity is largely confined to track meets promoted by owners of three or four racing cars who are traveling the country in this work. So far as reliability contests, road races and hill climbs, there have been very few this year in comparison with those that have had to be cancelled because of failure to get enough entries.

WHAT is the direct loss to the industry because of this curtailment of contests? A most apparent loss, and one which confronts the manufacturer every day, is the minimum of publicity which the industry is obtaining through the daily press, in comparison with the maximum it received some years ago when contests were participated in by the manufacturers. For a time the manufacturer imagined that the columns of motor news would be continued even if contests were dropped, but today he is being convinced otherwise; and is further learning the lesson that he must actually do something to create news. News is not some mental creation of a sales manager as he meditates at his office desk, rather it is a reporting of actual occurrences.

NOT in the present century has there been an industry that has been presented to the American public so widely as the motor industry, nor has there been another industry that has made such rapid progress. The attention of a nation has been centered upon it every day, every week and every month of the year. It has been a country-wide propaganda, one that has reached the smallest cottage as well as the palatial home or the leader of commerce or finance. It is a serious matter to lose this constant message to a nation. Contests have not lost their interest. The high-class events of this year have shown the interest to be greater than formerly, then why do manufacturers in the face of these facts hold aloof? Let the manufacturer answer.

EUROPE felt the same way about contests several years ago that America does now, and for three or four summers there were few, if any contests. Even the shows as publicity getters were condemned. Now, however, there has been an awakening abroad. Shows have been reinstated to popular favor, while France promoted more road races this year than it did in the palmy days of the sport. England, too, is arousing itself and will run a stock car road race next year. Keeping interest in motoring alive by means of high-class contests is far from being a poor investment. Your average American motorist is a sportsman and he dearly loves to watch the performances of the cars in races, hill-climbs and reliabilities.

Water for Batteries

THE increased use of storage batteries due to electric starters and electric lighting makes it more imperative that the owner give that attention to the battery which it merits. One respect in which this is particularly true is that of adding the necessary amount of distilled water to keep the battery plates covered. Many owners think it necessary that acid should be added to the electrolyte as frequently as water. This is a serious error. With the new battery it is not necessary to add acid for the first 6 months of its use, but distilled water should be added regularly. In hot summer weather the battery should be inspected at least every 2 weeks and in colder weather once a month.

THE best policy is to add distilled water which can be secured at drug stores in gallon bottles at a nominal price. Those who do not care to take the trouble of buying it at the drug store can secure it by melting artificial ice. To those in the country who may not have either of these sources available, fresh rain water will be entirely satisfactory. Do not use the rain water collected during the first few minutes of the shower when it contains more or less deposits from the roof of the building from which it is collected.

THE danger of using ordinary water in a battery is largely due to the iron salts. These salts when in the electrolyte adhere to the battery plates and set up local action with the material on the plates, thereby locally discharging the plate and correspondingly cutting down the capacity of the battery. Another salt that is to be guarded against is chlorine, which often is present in quantities sufficient to injure the electrolyte. The general brands of drinking water sold in gallon or 5-gallon bottles will be found satisfactory for battery work.

BATTERY manufacturers as well as car manufacturers are giving more attention to the proper carrying of the battery on the car. The old-fashioned method of supporting it on a couple of metal straps from the chassis and beneath the car body now is being replaced by the modern water-tight battery box which is rigidly constructed and provided with suitable drainage facilities. Car manufacturers are more and more recognizing the fact that the battery must be given consideration, and while it is not clamorous in its demands its passive requests nevertheless must be regularly heeded.

IT is about as absurd to carry a battery in an exposed condition where it can get drenched every time the car is washed and coated with mud on every trip to the country as it would be to drive the car with a filler cap off the gasoline tank allowing the dust and dirt to get into the fuel, or to drive the car with the hood off, leaving carbureter, magneto and other parts of the motor exposed. The battery deserves protection and its efficiency is increased several fold when it is given that moiety of protection and care which it deserves.

NOT until his cranking motor fails him, or his lights get dim, does the average motorist give his storage battery a thought, beyond perhaps an occasional refilling with water often obtained from the city mains. He fails to follow the car maker's instructions to test the strength of the electrolyte with the hydrometer even when he does not refill the battery. The condition of the fluid in the battery has a great effect on its life.

Motoring Invasion of the Land of the Cliff Dwellers

Pathfinders Start on 2,000-Mile Trip

CHICAGO, Sept. 23—Another expedition that will bring to the attention of motorists the wonders of the country from a touring viewpoint will start from Pueblo, Colo., Friday, when John P. Dods, western manager of the Automobile Blue Book Publishing Co.; James A. Harris, advertising manager of the White Co., of Cleveland, and Nathan Lazarnick, the New York photographer, in a White six-cylinder leave for a 2,000-mile trip through the southwest. The object of the trip is to gain firsthand information as to this wonderful home of the cliff dwellers, which is comparatively unknown to motorists.

Last fall Motor Age published, in a series of four articles under the title, "One Thousand Miles Through Colorado," a story of the touring possibilities of Colorado for the motor car owner. This article served not only to give the motorists from other states a better idea of the wonderful opportunities opened up by the good roads development, but actually told Coloradoans themselves many things about their own state that they had never fully appreciated. The data for these stories was collected by Mr. Dods, cooperating with Mr. Harris. The stories were so well received that it was determined to make a similar expedition into another section, and so on Friday morning the long scout starts. The story of the trip will be graphically told through the columns of Motor Age, fully illustrated with photographs taken by Mr. Lazarnick.

The accompanying map gives a general idea of the route to be followed, although numerous side trips will be made to visit the more important points of historical and scenic interest. The more prominent of these is the trip into Taos, N. M., the oldest of all the Pueblo villages. Fortunately, the White party will be there for the greatest of Indian festivals, that of the San Geronima fiesta, on September 30. Between Taos and Santa Fe other of the more interesting pueblos will be visited, also the ruins of the cliff dwellers. From Magdalena a side trip will be made to Acoma, the pueblo village located on top of the enchanted mesa; the petrified forest is taken in with a very slight detour off the main route and a short time will be spent at Grand Canyon.

Returning from Grand Canyon the most prominent points to be visited are the Moqui Indian villages of the First and Second mesas at Walpi and Oralli; more wonderful still is the trip to the Canyon de Chelly, about 35 miles north of Ganada. Out of Gallup a side trip will be made to the Zuni reservation, and from Durango a trip will be made to Mesa Verdi National park, in order to take in the cliff dwelling ruins, which are said to be the most picturesque and perfect of their kind.

Returning to Pueblo from Durango, the party expects to be one of the first cars over the newly constructed road of the Elwood pass, crossing the continental divide at an elevation of about 12,000 feet. This route takes them across the famous San Luis valley. The tentative schedule is as follows:

September 25—At Pueblo. Good roads meeting.
September 26—Pueblo to Taos via Trinidad and Raton.
September 27—Taos to Las Vegas via Springer.
September 28—Side trip around Las Vegas.
September 29—Las Vegas to Taos via Santa Fe.
September 30—At Taos for San Geronimo Fiesta.
October 1—Taos to Santa Fe.
October 2—Santa Fe to Albuquerque.
October 3—Albuquerque to Magdalena.
October 4—Drive to Enchanted Mesa.
October 5—Magdalena to Springerville.
October 6—Side trip to Ft. Apache.
October 7—Springerville to Holbrook, visiting petrified forest.
October 8—Holbrook to Flagstaff.
October 9—Trips round Flagstaff and drive to Grand Canyon.
October 10—At Grand Canyon.
October 11-13—Grand Canyon to Gallup, via Keams Canyon and Ganada.
October 14—Gallup to Zuni.
October 15—Gallup to Farmington.
October 16—Farmington to Durango and Cortez.
October 17—Return to Durango.
October 18—Durango to Pagosa Springs.
October 19—Pagosa Springs to Alamosa.
October 20—Alamosa to Pueblo.

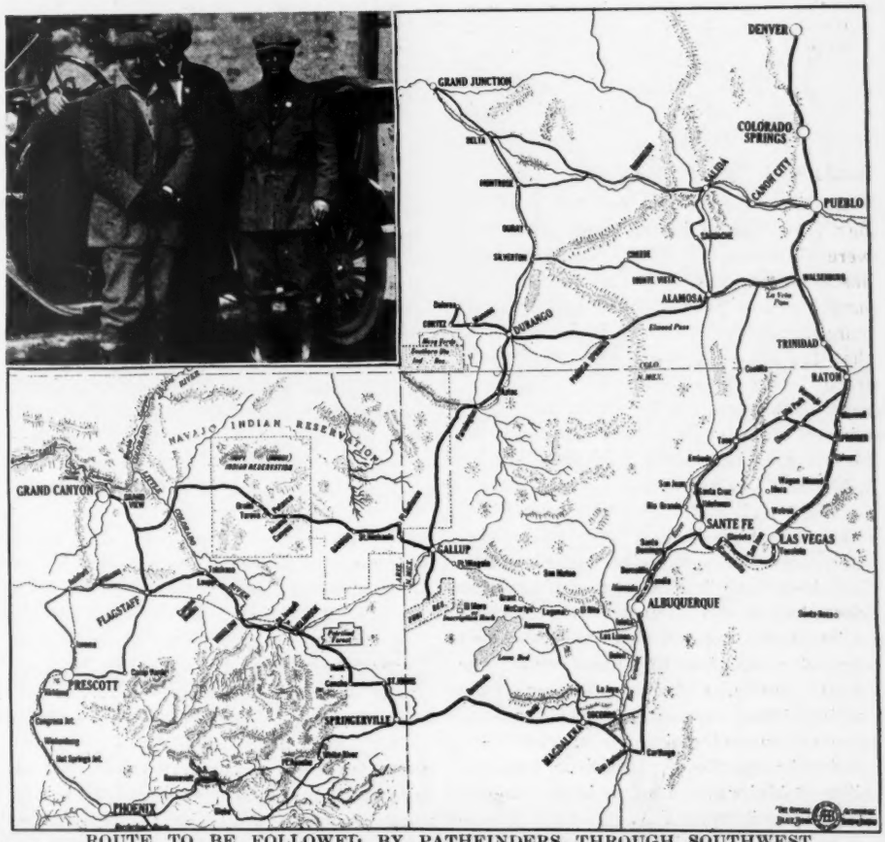
QUAKERS HOLD BIG RUN

Philadelphia, Pa., Sept. 20—Despite unfavorable weather conditions sixty-two cars participated in the Lu Lu Temple Automobile Club's third annual sociability run from the organization's headquarters, Broad and Spring Garden streets, to the Hotel Strand, Atlantic City, N. J., today. J. W. Maurer, driving a Cadillac car, won the silver bowl emblematic of first honors by completing the 69 miles in 3 hours 43 minutes 22 seconds, 16 seconds shy of the official secret schedule, which was 3 hours 44 minutes 38 seconds. Joseph Way, president of the club, driving a Packard, won second prize, time 3 hours 43 minutes 44 seconds. Third prize was captured by C. L. Firth, Oakland car, in 3 hours 42 minutes 11 seconds, and fourth prize to F. E. Stockwell, Ford, 3 hours 41 minutes 52 seconds.

The run was the most successful since the event was inaugurated three years ago, and was a preliminary to the commemoration of the ancient feast of Al-Moolah, held on the pier.

PREMIER RETAINS AIR CRANKER

It was statel in Motor Age, September 18 issue, that the air cranking system which has been a feature of Premier cars for several years is to be abandoned and replaced by an electric system in the new models. This statement was an error, as the Premier company is not contemplating such a change and will retain the pneumatic installation.



ROUTE TO BE FOLLOWED BY PATHFINDERS THROUGH SOUTHWEST
Illustration in upper left-hand corner shows N. Lazarnick, J. A. Harris and J. P. Dods in order

Heavy Traffic on Highways Makes Bay Staters Ponder

Commission Reports on Road Maintenance and Bridges

By J. T. Sullivan

BOSTON, MASS., Sept. 20—There are some very interesting conclusions and comparisons in the annual report of the Massachusetts highway commission recently issued that will be given consideration, no doubt, at the convention of engineers attending the third annual road congress at Detroit beginning Monday, September 29.

Road maintenance, traffic and bridge construction are all given consideration, and some basic facts are presented that come from actualities. In referring to the traffic, the report states that in the last 3 years the travel over the state highways in Massachusetts increased more than 40 per cent and the motor traffic more than 121 per cent. In some places there were from seventy to seventy-five trucks a day where formerly there were none. This traffic will in the future require the resurfacing of many miles of road with some more permanent material than waterbound macadam, and undoubtedly many miles will require reconstruction at a large expense, as the upper 3 inches, at least, should consists of some bituminous macadam.

With this increase in travel roads will have to be widened, and that wherever possible highways now 15 feet will have to be made at least 18 feet on all the main through lines. Also it is absolutely necessary today to apply some form of dust-layer or bituminous binder to macadam roads, either by surface or by incorporating it with the upper 3 inches of broken stone. Unless this is done the roads will shortly be destroyed by high-speed motor traffic.

Roads Show Improvement

At the present time the roads in the Bay state are in better shape than they were 3 years ago. The division engineers report that while there are many stretches that need reconstruction with a more permanent surface, it is also true that the state highways as a whole have stood traffic very well. In Chief Engineer Dean's section he states that bituminous material has been used in the maintenance of state highways during 1912 on 283.55 miles, and in construction, on 21.38, and there are at present 729.83 miles on which it has been used either in construction or maintenance. While there have been few failures of bituminous roads the use of bituminous material seems to be at the present time an economical way of preserving the roads under the present traffic, and he recommends the continued use of this material for both construction and maintenance. The commission has on file now petitions for 2,000 miles of highways showing how the good roads idea is spreading.

The question of bridges is worth consideration everywhere now, in view of the fact that motor trucks carrying large loads are making long trips, and some of the bridges are weak. The commission after referring to the placing under its control of bridges in Newburyport and Taunton, and the estimate cost of keeping them in repair makes the following statement:

Commission Makes Statement

Legislation of this character is a new departure from the former policy of the commonwealth. Originally many of the larger bridges were toll bridges, built and maintained by private corporations. As the charters of these corporations expired, the bridges were made free, and the expense of maintaining them was placed upon the county or the cities and towns in which they were located. A number of special acts have been passed requiring the building of certain bridges, and dividing the expense in certain ways between the counties and municipalities benefited. In only a very few instances has the commonwealth paid any part of such expense, and then only a small part. In one instance at least, the commonwealth's payment was because of the abolition of a grade crossing being involved.

The commission feels that it should call the attention of the legislature to the fact that an extension of this policy, requiring the commonwealth to maintain large, expensive bridges, even on the main through routes of travel, would involve an annual appropriation by the commonwealth several times as large as the amount appropriated for the maintenance of the state highways. Should the commonwealth undertake the construction of such bridges and the necessary street improvements, or the reconstruction of the many old or inadequate bridges on through routes near the larger cities, the cost of such construction and improvements would very soon be several times as great as the total amount spent on state highways annually, and the expense of maintaining a bridge department, with the necessary engineers easily would cost as much or more than the cost of maintaining the present engineering force. Quite a number of the bridges that now require rebuilding, with the improvements in the streets necessary for the accommodation of the present traffic, would involve the expenditure of several billion dollars in the next few years.

The above statement by the commission is of special interest to the makers of motor vehicles, and particularly the makers and users of motor trucks. It is the warning sign that cities and towns should not be allowed to unload on the states the bridge question. That there is a movement in this direction is shown by what has been done already in Massachusetts. To continue, it would mean this big expense as the highway commission points out, and following as a regular course of events would come the increased taxation of motor vehicles to attempt to pay the costs or some of them. The cities and towns would be relieved of the burden, and they would grow rich, for the local taxes would go to them, to be sure, but the registration fees would soar to pay for what the cities and towns unloaded unjustly on the state. It is something that should be watched by the motor industry. The highway commission does not say so, but it is easy to read between the lines that increased state taxes would mean greater burdens for the motor owners. This matter should be brought to the attention of the road congress for discussion.

Referring to road building the report states that it is most important to have an accurate knowledge of the traffic which any particular road has to carry. The road has to be designed, built and maintained so that it shall at all times be in proper condition to bear traffic to which it may be subjected, and not only at the least cost to the user, but also at the least ultimate cost to the taxpayers, taking everything into account, viz., interest, sinking fund, yearly maintenance and occasional resurfacing.

Report on Traffic Census

The report adds that without such knowledge one is really at sea. The road builder is likely to make serious and costly errors by determining upon the wrong kind of construction and by selecting improper or unsuitable materials or methods. In reference to the traffic census taken by the commission the report states that while the 1912 count was taken at eighty-two fewer stations than the 1909 one it is felt that the percentages of increase could be safely used to indicate traffic on other similar roads. As a result of the figures obtained by careful observers, and which were carefully compiled, it was shown that the traffic using the roads in Massachusetts was constantly increasing as shown by the table given herewith:

	1909 Census. 238.5 Stations			1912 Census. 156.5 Stations			
Motors—	Average number per day. Total	Average number per day. Station.	Percentage of each class	Average number per day. Total	Average number per day. Station	Percentage of each class	Increase or decrease percent
Runabouts	4,958.5	20.8	8.5	5,819.0	37.2	11	+79
Touring cars	17,950.5	75.3	30.5	27,178.5	173.5	49	+130
Trucks	.....	....	....	1,800.0	11.5	3	....
Total	22,909	96.1	39.0	34,797.5	222.2	63	+131
Horse-drawn vehicles—							
One-horse, light	17,033.0	71.5	29.0	8,380.0	53.5	15	—25
One-horse, heavy	11,762.5	49.3	20.0	7,458.0	47.6	14	—3
Two or more horses, light	1,006.0	4.2	2.0	556.0	3.6	1	—14
Two or more horses, heavy	6,205.5	26.0	10.+	3,870.5	24.7	7	—5
Total horse-drawn	36,007.0	151.0	61.0	20,264.5	129.4	37	—14
Totals of all kinds	.....	247.1	....	.....	351.6	..	+42.

The above mentioned figures represent a traffic count taken in 1909 and 1912 for 14 days in each year, and from 7 a. m. to 9 p. m. daily. It shows that the total number of vehicles using the road has increased 42 per cent in 3 years, a very noticeable increase. This is not the most significant feature for the road builder, however, for it is the change in the traffic that he must consider and for which he must make preparations.

Certain Truck Is Here to Stay

That the motor truck has come to stay is very evident as a resume of the figures are given. The report states that the factors of road building cannot be grasped until one is familiar with and analyzes the truck situation. According to the commission, motor vehicles have increased 131 per cent in 3 years, or from 96 to 222 a day; on the other hand the teams have decreased on the average of 14 per cent, or from 151 to 129 a day, making the net increase only 42 per cent. Light single horse-drawn vehicles have decreased 25 per cent; two-horse light vehicles 14 per cent, while heavy single-horse teams have decreased only 3 per cent, and heavy teams with two or more horses have decreased but 5 per cent.

It is equally interesting for future consideration to know that while in 1909 there were almost no motor trucks, in 1912 there was an average of over eleven per station per day, or about 3 per cent of the total traffic in numbers and much more in weight. What will it be in future? The increase in motor trucks between the census taken in August and that taken in October was noticeable. The average number of vehicles at each station decreased seventy-two a day or 18 per cent, while the number of motor trucks actually increased 4 per cent. In one town there was an average of only one truck a day in August, while in October there were twenty-seven. In another town there were twenty-seven a day in August and forty-nine a day in October.

One must remember that the average of eleven trucks per day per station is merely an average for the 156 stations all over the state, country towns as well as near cities. On some state highways near the cities there were often found from fifty to seventy-five trucks a day and usually from fifteen to thirty. On some roads motor trucks constituted more than 16 per cent of the total number of vehicles and actually outnumbering touring cars. Merely to illustrate, it might be stated that on some of the roads there were 2,100 to 2,400 vehicles daily, and on many there were 800 to 1,000, and yet the average for the whole 156 stations was about 350.

That good roads is responsible for an increase in travel is shown by the traffic census. For instance on the road going north from Boston to Maine and New Hampshire summer resorts there was an average of 185 vehicles a day on the new road through Salisbury in 1909. In 1912 it had jumped to 586, an increase in 3 years of 217 per cent. Motor cars had increased from an average of 135 a day to 405 or about 200 per cent, and heavy teams from 25 to 97, or 288 per cent. At the same time the route in North Beverly, where the roads were equally good, the increase was 34 and 74 per cent. The total number at all three points in 1912 was not very different. Salisbury, with a good road, had merely caught up.

The Newburyport turnpike is another good illustration. This was a bad, hilly road in 1909, and although the shortest road between Boston and Newburyport at one station there were only eighty-one vehicles a day. In 1912 at the same point there were 333, an increase of 300 per cent. Motor cars had increased from thirty-four a day to 249. At another point there was an average of six to seven teams a day in 1909, and six to seven motor cars, or about thirteen vehicles a day. In 1912 there were twenty-nine teams and eighty motor cars, or seven times as many. Yet the state had expended but $1,000 a mile improving it, and it is a gravel road of ordinary proportions. Later on this increase will be more noticeable when the conditions become more fully known.

Weight Important Consideration

An important consideration is weight, according to the report. Not weight alone, but the vehicle by which it is transported, whether by horse or motor. It is not the tractive power alone that makes the difference, but the tires which support the vehicle; whether iron or rubber comes in contact with the road; whether the vehicle is pulled over the road or propels itself, and thus pulls upon the road surface.

All of these considerations are not so important probably on many road surfaces as the actual weight imposed upon the road per inch of width tire resting upon the surface. In other words, narrow tires supporting heavy loads, having a weight of more than 600 or 800 pounds for each inch in width of tire, do vastly more damage to most, if not all our roads than do very much heavier loads where the weight per inch of tire width is less. Such loads carried on such narrow tires will practically destroy any road surface except a pavement in a few months if there are many such vehicles using the road every day.

The commission has adopted a plan to determine the weight of traffic, and it is based on one in vogue in both England and France, and also by some other nations on the continent. This is an assumed weight, or coefficient, for each kind of vehicles using the roads in order to make a fair comparison where the traffic varies. The following table shows the weight of road traffic on Massachusetts roads computed in this way, with the coefficient reduced to tons of 2,000 pounds each in every case:

Motors—	1909			1912		
	Average number per day. Station	Assumed weight (tons)	Weight per day. Station (tons)	Average number per day. Station	Assumed weight (tons)	Weight per day. Station (tons)
Runabouts	20.8	1.43	29.7	37.2	1.43	53.2
Touring cars	75.3	2.23	167.9	173.5	2.23	386.9
Trucks	.....	6.25	.....	11.5	6.25	71.9
Totals	96.1	.....	197.6	222.2	....	512.0
Horse-drawn vehicles—						
One-horse, light	71.5	.36	25.7	53.5	.36	19.3
One-horse, heavy	49.3	1.12	55.2	47.6	1.12	53.3
Two or more horses, light	4.2	.54	2.3	3.6	.54	1.19
Two or more horses, heavy	26.0	2.46	64.0	24.7	2.46	60.8
Totals	151.0	....	147.2	129.4	....	135.3
Totals of all kinds	247.1	....	344.8	351.6	....	647.3

Here again, the report states, not only are the changes in traffic notable, but the weights are even more important. The average weight per station per day in 1909 was 197 tons; in 1912 it was 512 tons. For horse-drawn vehicles it was 147 in 1909 and only 135 in 1912. The weight of motor traffic has increased 160 per cent in 3 years, while the weight of horse-drawn traffic has actually decreased 8 per cent in the same time. While this is true, note what happened: The motor truck has come in with an average of 11½ per station, and their weight is nearly 72 tons a day. The weight of teams decreased 12 tons a day; trucks came in with a weight of 72 tons a day, making good the loss in team weight six times over.

Pace Tells on Roads

The experience in Massachusetts and elsewhere has shown conclusively that large numbers of swiftly moving motor cars cannot be carried successfully over a waterbound macadam road or over a gravel road. Such a road becomes raveled very rapidly and becomes rutted and disintegrated. Our traffic studies indicate that from fifty to 100 motor cars a day make the use of some dust layer or binder necessary. Possibly its use would prove economical on a road where there is even less motor traffic.

With the motor traffic which Massachusetts already has, the commission is obliged, both for economy and efficiency, where a road has heavy team traffic as well, to adopt in construction or resurfacing some form of bituminous mixture for the upper 3 inches on surface at least, or some stronger road like concrete. On the other hand where there are little or no teams, and even as high as 500 motor cars a day, oiled gravel roads do very well, or roads composed of sand and asphaltic oil.

Saving Old Roads

A good many miles of old macadam road have been saved and maintained by ½ gallon of hot asphaltic oil spread upon each square yard of surface and properly covered with sand, pea stone or gravel. Many of these roads have worn 3 years and are on their fourth year and still in good condition. The patching has cost but little, their treatment and maintenance might average from 2 to 3 cents a square yard a year. Yet these roads often have very heavy traffic, often more than 1,000 motor cars a day. One has more than 500 teams and 1,000 motor cars a day, and a heavy blanket of oil has worn well for 3 years and is going on its fourth.

One of the most important statements of the commission was the admission that teams drawn by horses do a great deal of damage. It is not the number, but the heavy teams, the report states. On one stretch of road fifty to seventy-five ice teams carrying 3 tons each on 2½ or 3-inch tires crumpled up the road and broke the surface where it was oiled in 1 month's time. The road lasted 3 months on the other side where the teams came back empty. Beyond the ice houses this same road is still in good condition after 3 years for some miles where the teams do not go. On the Gloucester road, where some coal teams were passing to a summer hotel three or four times a day with from 6 to 7 tons of coal on narrow tires the road was rutting and wearing out rapidly in 1909. A motor truck was substituted for the coal team, and the surface of the road, which had been oiled, was again in good condition. It has worn 3 years and now needs only patching to make it good.

As a result of all the experiments the commission has prepared an interesting table showing as nearly as may be the results which have been observed after 4 years of experience with bituminous materials comparing these results with the traffic going over the road in 1909 and 1912. The standard road is 15 feet in width of macadam with a 3-foot gravel shoulder on each side.

MICHELIN REDUCES PRICES

New York, Sept. 23—The Michelin Tire Co. has announced a cut in prices for inner tubes approximating 10 per cent, and also a cut in casings ranging from 8 to 9 per cent.

Houk Buys McCue Wheel Interests

BUFFALO, N. Y., Sept. 24—George W. Houk, president of the George W. Houk Co., Philadelphia, controller of the American licenses for the Rudge-Whitworth wire wheel, today purchased outright the plant, good will, stock in trade, trade name, trademarks, accounts receivable and cash on hand of the McCue Co., 1700 Elmwood avenue, of this city, which concern has been manufacturing the McCue wire wheel for upwards of 2 years. The consideration paid is $400,000 together with assuming indebtedness of the McCue company aggregating $38,000.

Mr. Houk takes possession tomorrow morning of the McCue plant, and its force of 300 men will continue the manufacture of a new type of wheel developed along Rudge-Whitworth lines, and to be known as the Houk detachable wheel. This wheel will be a medium-priced one, listing at approximately 75 per cent of the present price of Rudge-Whitworth wheels, manufactured for the George W. Houk Co., Philadelphia.

Mr. Houk's relationships with the George W. Houk Co., Philadelphia, will not be interfered with by this new acquisition, but will continue as in the past the sole American licensee of the Rudge-Whitworth detachable wheel, and will market it as heretofore.

The management of the McCue plant will be under a new company, known as the Houk Wire Wheel Co., which is at present being organized. George W. Houk will be president, and W. F. Evans, who has been general manager of the McCue Co., will assume the management of the new organization. The capitalization of the new company will be $900,000, of which $400,000 preferred stock has already been subscribed by Buffalo capitalists. The preferred stock will carry a 6 per cent dividend. The remaining stock, $500,000 common, is not on the market.

HENDERSON INTERESTS NEW CAPITAL

Indianapolis, Ind., Sept. 22—Over the signature of C. P. Henderson, president of the Henderson Motor Car Co., the following announcement regarding the condition of the company was made today:

All factional differences in connection with the Henderson reorganization has been happily settled by the election of Franklin Vonnegut, Arthur R. Baxter and A. R. Smith, prominent Indianapolis men, as members of the board of directors representing the new interests which control approximately $200,000 of the company's operating capital. By this arrangement the suit recently instituted by one of the Indianapolis parties is withdrawn and a satisfactory settlement of all differences provided for. A cheaper car with the Henderson nameplate and using a kerosene carbureter is being considered and when finally decided upon will be announced by the company.

This statement follows the application for a receiver made last week by Archibald M. Hall, of Indianapolis, who conducts a special machine work business, whose claim amounted to $1,509.10. The company objected to this appointment, claiming its assets largely exceed the liabilities and that there was no occasion for the appointment of a receiver. Now it is asserted the cloud has cleared and that the Henderson company will continue without trouble.

NYBERG IN RECEIVER'S HANDS

Indianapolis, Ind., Sept. 23—Frederick Van Nuys, of Anderson, a state senator, was appointed receiver for the Nyberg Motor Works at Anderson by Judge Austill, of the circuit court, in that city yesterday afternoon. The receiver has been ordered to take an inventory and close the affairs of the company.

The petition for a receiver was filed by the National Exchange Bank of Anderson. The physical value of the property is said to be from $150,000 to $200,000 and the liabilities in the neighborhood of $90,000 or $100,000. The plant has been operated at a profit, but suffered considerable loss in the March floods.

Carl Lemcke, business manager of the Nyberg company, said that the company's credit had been injured by letters sent out by attorneys anxious to obtain clients, and that as a result the company has had to pay cash for material. He said only enough material for 400 cars had been obtained, although the company had contracts for 1,000 cars.

In the afternoon a petition in bankruptcy was filed in the United States court and John C. Teegarden was named as receiver.

CHICAGO TAXICABS TO BURN COAL

Chicago, Sept. 20—The Owen H. Fay Livery Co., which operates numerous taxicabs in Chicago, announces that it has ordered fifty Coleman gas producers for its cabs and that after January 1, these cabs will use coal as a source of fuel instead of gasoline.

Speaking of this radical change, Owen H. Fay said that the high cost and low grade of gasoline being furnished might seriously interfere with profits and that his company viewed with alarm the approach of winter when inevitable delays occurred in getting engines started after they have been standing in the cold.

"We have tried kerosene," continued Mr. Fay, "but have found it unsatisfactory as its use has caused heavy carbon deposits on the cylinder heads and gummed up the plugs. The further difficulty of priming with gasoline also caused delay, a thing above all others which we have to avoid in the taxicab business. On a recent trip to New York, I saw a bench test of the Coleman gas producer and became so enthusiastic over it that I have given an order for fifty of my cabs to be equipped with this device which uses coal as a source of fuel and produces a clean gas which should start any machine on the third cranking, providing that the valves are tight and the ignition in good

shape. The apparatus is now being built in the shops of the John Splitdorf Corp., in New York.'' Mr. Fay states that the producer and coal enough for a 200-mile run can be carried in the same space under the seat as now taken by the present gasoline tanks. The details of construction and operation of the new producer system can not be divulged at this time on account of the patent situation.

This purchase is additionally interesting in view of the fact that the Coleman Gas Producer Co. has entered the $10,000 competition of the British Society of Motor Manufacturers and Traders, and that a car equipped with this device will be shipped to Europe on Oct. 15 for trial.

RECEIVER'S JOB FOR TONE

Indianapolis, Ind., Sept. 22—The superior court at Indianapolis has appointed Fred I. Tone receiver for the Electro Light and Starter Co., in a suit brought some time ago by a creditor. The company has been embarrassed from lack of funds for current operations and believes that the embarrassment will be only temporary and that full settlement can be made with creditors.

FIRESTONE'S GROSS EARNINGS

New York, Sept. 23—The gross earnings of the Firestone Tire and Rubber Co., Akron, O., for the fiscal year ending July 31, amounted to approximately $15,000,000. For a similar period ending July 31, 1912, the gross earnings were $11,500,000. For the fiscal year ending July 31, 1913, the net profits were $1,600,000 and the surplus for the year $1,250,000. According to the balance sheet the current assets of the company were $7,000,000.

ENGLAND TRIES LAMPLOUGH PROCESS

London, Sept. 12—The Lamplough process for manufacturing motor spirits from tar oils and from which source it is estimated that 40,000,000 gallons per year can be manufactured and sold at 28 cents per gallon, has, during the past week, been considered satisfactory for the manufacture of motor spirit from creosote oil, expert chemists who have been investigating the possibilities of using this process being unanimous in this conclusion. To date there only has been an experimental plant in actual operation, in which the Lamplough process is used, but a larger plant is being erected at the present time.

This process consists in decomposing a tar oil or creosote oil with steam. The oil and steam flow through a series of heated tubes containing nickel rods. The water decomposes in the presence of the heated nickel and the hydrogen in its nascent state combines with the oil, bringing about a synthetic action, and producing motor spirits. Shale gas oil with a specific gravity of 0.860 produced motor spirits with a gravity of 0.760, and the yield of motor spirits is practically 43 per cent of the value of the original oil.

Industry Mourns Bennett's Death

TOLEDO, O., Sept. 20—Business men of this city and members of the motor industry all over the country were deeply shocked Thursday morning when the death of George W. Bennett, vice-president and general manager of the Willys-Overland Automobile Co., was announced. It had been known that Mr. Bennett was ill and that an operation had been performed for appendicitis at the Flower hospital here. The afternoon papers on Wednesday carried an account of the race made by two famed surgeons from Detroit and Cleveland, against death but Mr. Bennett's death, which accurred about 3 o'clock Wednesday afternoon, was not announced to the public until the following morning.

Mr. Bennett was first taken ill at Lima, O., a week prior to his death. He returned to Toledo on Friday and underwent an examination by physicians and he was told that an immediate operation alone would save his life. The operation was performed by Drs. Smith and Stone of Toledo. Septic peritonitis developed later and finally caused death. The funeral took place Saturday morning from the residence, 15 Bronson place, and was private, only the closest men friends of the deceased being present. The body was temporarily placed in the Cherry street mausoleum.

MORE CAPITAL FOR SIMPLEX

New York, Sept. 24—Special telegram—At the annual meeting of the stockholders of the Simplex Automobile Co. it was voted to increase the capital stock from $1,000,000 to $1,500,000 in order to take care of the increased business made possible by the new factory at New Brunswick, N. J. The board of directors has been changed and is now as follows: President, Henry Lockhart, Jr.; first vice-president, Otto Boessneck; second vice-president, J. Hopkins Smith, Jr.; secretary and treasurer, C. T. Newbourg. The other members of the directorate are Hobart F. Park, C. C. Goodrich, Hugo Boessneck, Robert Behr, G. J. Lansing, John G. Dale and G. E. Frankquist. Lockhart, Smith and Goodrich are members of the firm of Goodrich, Lockhart & Smith, bankers, 60 Broadway, and Mr. Goodrich also is a director of the B. F. Goodrich Co., which was founded by his father. Fred Titus, formerly of the Alco company, has been appointed assistant manager of agencies to take up road work.

SCHACHT PLANT TO BE SOLD

Cincinnati, O., Sept. 23—The entire stock and outfit of the Schacht Motor Car Co.'s plant has been ordered to be disposed of by receivers' sale by the insolvency court of Hamilton county. The date of the sale has been set for October 20 and will continue until everything is sold. The company went into bankruptcy some weeks ago and the directors are still fighting each other, with the result that a hopeless tangle has resulted. When the company refused to get out a 1914 car, Receiver Dietz recommended to the court that the stock and outfits be placed on sale.

A. O. SMITH CO. ELECTION

Milwaukee, Wis., Sept. 19—At the annual meeting of the stockholders and directors of the A. O. Smith Co., held today, the following officers were elected: President and general manager, L. R. Smith; vice-president, C. S. Smith; secretary, E. M. Smith; treasurer and assistant secretary, James L. Sinyard; assistant treasurer, Joseph J. Stamm; sales manager, James L. Sinyard. Directors: L. R. Smith, C. S. Smith, E. M. Smith, James L. Sinyard, John P. Kelley. L. R. Smith succeeds his father, A. O. Smith, deceased, as president of the big manufacturing concern.

HART-KRAFT SALE UNSUCCESSFUL

York, Pa., Sept. 19—A second unsuccessful effort was made this week to dispose of the Hart-Kraft Motor Co. at public sale, but there were no bidders. The property was offered as a whole and started at $30,000. It was announced that the property can be purchased at private sale from Attorney Donald H. Yost, the receiver. A previous attempt to dispose of the plant at public sale was made on August 12.

SILENT ON BIG INCORPORATION

Wilmington, Del., Sept. 24—Special telegram—Local representatives of the Michigan Motor Car Co., incorporated at Dover, Del., with $1,000,000 capital, September 18, decline to give any information beyond the fact that George E. Reynolds, 328 Frick building, Pittsburgh, is attorney. The incorporators of record are all local men connected with the Corporation Trust Co. of America, 392-398 Dupont building, as follows: Herbert E. Latter, William J. Maloney and Oscar J. Reichard.

NEW LINE FOR CHEVROLET.

Flint, Mich., Sept. 20—The Chevrolet Motor Co., Flint, Mich., is planning to enter the low-price field in 1914 and is about ready to market the following line: Royal Mail runabout at $750, Phaeton runabout at $800 and the Baby Grand touring car at $875. Electric starting and lighting system will be supplied at an added cost of $135. The Chevrolet output for 1914 also will include a light six with a five-passenger touring body and electrically lighted and started for $1,475 and a model C touring car at $2,500. The production of the Little four has been discontinued.

Routes and Touring Information

Three Months' Roughing It in a Motor Car

By Frederick W. Herendeen

Motorists Get Close to Nature

SOME of my friends said I couldn't do it, some said I wouldn't do it, but pretty near all of them agreed that I would get mighty sick of the trip before I got back. Nevertheless, with my wife, together with my efficient mechanician, Frank, who has driven with me during the past 6 years for upwards of 100,000 miles, and his wife, to take care of us, we started July 5, on a combined motoring, camping, fishing and hunting trip that in general would take us through the Catskills, Berkshires, around Lakes George and Champlain, through the White mountains, through Maine into New Brunswick and thence to Nova Scotia.

There are no text books written, at least I knew of none, on how to outfit four people on a combined motoring, camping, fishing and shooting expedition, so that in order to pick up the required equipment, a trip to New York was necessary.

Equipping for the Tour

I assume that brother motorists may be interested in this equipment and therefore, I will go into the details somewhat. We carried two silk tents, 7½ feet square, equipped with windows and mosquito net fronts. These tents packed into an extremely small space and were most satisfactory. They were set up by means of collapsible steel rods. We also carried an 18 foot square silk tent, which was used as a shelter, storage and dining-room tent. We carried four air mattresses which were very serviceable, and satisfactorily solved the sleeping problem. A collapsible aluminum cooking outfit gave us an abundance of intelligently-planned cooking utensils which were ample and sufficient to take care of our needs. Collapsible chairs and tables we would not be without. Fifty feet of 1-inch rope, a shovel and an ax were in constant use. We were obliged to add to our blanket equipment as the nights were cooler than anticipated. This equipment, together with personal luggage of light, heavy and storm clothing, rifles, fish poles, shotguns, barometers, compasses and kodak equipment, together with medicine and emergency kits, extra tires and tools, were packed on the luggage carrier, specially built on the rear of my Selden car, and along the running boards. The total weight of the car, packed and with four passengers, was 5,300 pounds.

During a trip of 5,000 miles over a period of 3 months, no troubles of any kind developed save those incident to no roads or extremely bad roads, where we would occsionally get stuck and be obliged to windlass our way out or build a road of fir trees in order to get traction.

Our first camp was on Lake George where we stayed upwards of 3 weeks, and where, incidentally, we all took the typhoid treatment.

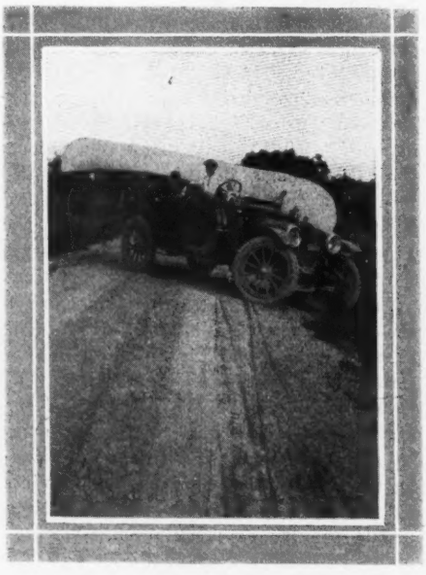
In the Wilds of Maine

Our second camp was in the wilds of Maine, or what is known as the Air Line road, which runs from Bangor to Calais and which the Blue Book describes as being extremely hazardous; overgrown with trees and one that only venturesome spirits should attempt to navigate. The road itself, winding through virgin forest, is most beautiful. One encounters on this road extremely stiff hills—almost mountains—but they can be negotiated without trouble with a light car, or with a heavy car, provided heavy rains do not interfere with traction. For upwards of 20 or 30 miles on this road there is no house or habitation of any kind.

WE ENTERTAIN VISITORS AT OUR MAINE CAMP

In the Forests of Maine and Canada

We went into our second camp on Pleasat River pond, situated some 7 miles east of the town of Bedding ton, Me., which consists of three houses. Beddington is north of Cherryfield, Me., some 30 miles. We used Beddington as a base of supplies because the stage runs from Cherryfield to Beddington and therefore could bring us gasoline and food. We were able to drive our car and leave it at the junction of the "Tete" road and the



CARRYING A CANOE 20 MILES ON A MOTOR CAR

Air Line road, a mile and a half from the lake. This mile and a half was always walked, for the reason that no car in existence is able to negotiate it.

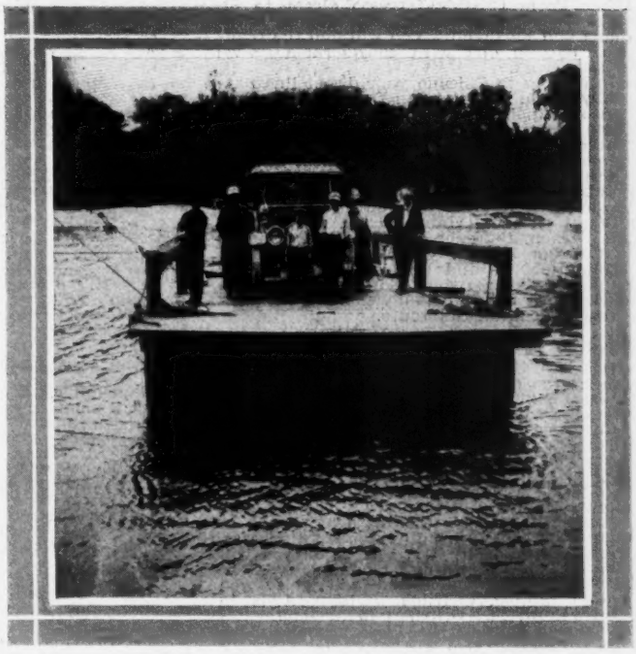
This camp, which is situated in Washington county, is on a lake where game of all kinds is in abundance. Bear, moose, fox, deer and partridges are frequently seen. Fishing in and about this country is exceptionally good, although the best fishing, of course, comes in the spring.

I commend the Air Line road to motorists who desire to travel off the beaten track. Miss Schoppee, who lives in Beddington, will furnish supplies, including gasoline, to camping parties. In fact, part of her farm house is well conducted as a hotel.

Our third camp was made in New Brunswick, some 14 miles north of the charming little town of St. George, where an exceptionally good hotel is located. We were in camp around the Bonny river district and were literally surrounded with the forest unbroken,—a wonderful fishing and hunting country. Moose and deer are very abundant in this section.

The roads through New Brunswick are nearly all utterly bad, but the scenery repays the motorists for the trip. In fact, the scenery from Bangor, via the Air Line road, to Calais, Maine, through St. George, New Brunswick, to St. John, New Brunswick, is delightful. At St. John we crossed the Bay of Fundy and toured successfully through Nova Scotia, returning to our starting point at Geneva, N. Y., over different roads in Maine, going to Boston and through Massachusetts, home.

The 3 months that we put in were successful in every respect and I commend a camping, fishing and hunting motor trip to those who are fond of the outdoor life, where nature has not been attacked by many visitors and still presents the wildness and the wilderness charm. Such a vacation will be thoroughly enjoyed.



PRIMITIVE FERRY NEAR THE CANADIAN BORDER

Answers to Touring Route Inquiries

Winner, S. D.-Joplin, Mo.

WINNER S. D.—Editor Motor Age—Please give me the route from Winner, S. D., to Joplin, Mo. Are these roads marked and in the Blue Book after one leaves Norfolk, Neb.? About what is the distance from Winner to Joplin?—James E. Thomas.

Motor Age is not positive of the best route for you to follow until meeting the Meridian road at some point between Bridgewater, S. D., Yankton, S. D., or Norfolk, Neb.

You may find it advisable to come east, but it is not known just where you can cross the Missouri river. Possibly you know the best route to Norfolk. From there on it is recommended that you follow the Meridian road to Columbus 51 m., passing through Madison and Humphrey. Columbus to Belleville 129 m., via Stromsburg, York, Fairmont, Geneva, Hebron and Chester. Belleville to Topeka 157 m., passing through Cuba, Clyde, Clay Center, Manhattan and St. Mary. Topeka to Kansas City 78 m., via Lawrence and De Soto. Kansas City to Joplin 181 m., via Harrisonville, Butler, Rich Hill, Nevada, Lemar and Jasper.

At whatever point you meet the Meridian road you will find complete directions given in the Blue Book from there to Joplin.

St .Joseph, Mich.-Jacksonville, Fla.

St. Joseph, Mich.—Editor Motor Age—Will you kindly furnish me with the preferred route between St. Joseph, Mich., and Jacksonville, Fla., also with any detailed information concerning same?—A Subscriber.

There are two ways for you to choose from on the route to Jacksonville Fla., the first and more direct is go to South Bend 34m., from there to Indianapolis via the Michigan road through Logansport 136 m. via Peru and Kokomo 141 m., the latter being a little better. Indianapolis to Louisville 169 m., via Martinsville, Bloomington, Bedford, Paoli and Fredericks-town. Louisville to Nashville 200 m., via Bardstown, New Haven, Buffalo, Bear-Wallow, Glasgow, Scottsville and Gallitin.

This part of your route from Louisville is the worst you will encounter on the whole trip and one not recommended for tourist travel. Local people claim that considerable improvement has been made in the route since last year, but it has been learned recently through people who have gone over it that it is very much improved over last year, when one of the Blue Book cars covered the routeñ reporting that from Bardstown on, it was very rough and in many places so rocky that it was liable to spoil a set of tires on a 200-mile run. This stretch of road is the reason for recommending the longer route spoken of above.

Nashville to Chattanooga 143 m., over fairly good dirt roads, although quite hilly and mountainous country. You will pass through Murfreesboro, Beach Grove, Manchester, Pelham and Jasper. Chattanooga to Atlanta is good road 143 m., via Lafayette, Summerville, Rome, Cartersville and Marietta.

From Atlanta to Jacksonville there are two ways, one via Macon, the other via Augusta and Savannah. We believe you will find the latter preferable. It is 296 miles to Savannah via Covington, Madison, Milledgeville, Louisville, Waynesboro, Sylvania and Rincon. Savannah to Jacksonville 176 m., via Eulonia, Darien, Brunswick, Owens Ferry, Boulogne and Callahan.

The other route which was referred to is different throughout and takes you from South Bend to Ft. Wayne 78 m., from there to Lima 63 m., Columbus 89 m., Wheeling, W. Va., 128 m. The smaller towns passed through on this route are not given as details have been given many times this year in earlier issues of Motor Age. Unless you particularly desire to go into Pittsburgh you can go from Wheeling to Cumberland 133 m. over the Old National highway, passing through Washington, Beallsville and Uniontown.

From Cumberland you go southeast 71 m. to Winchester, passing through Ronney and Capon Bridge. At Winchester you meet the New York-Atlanta highway and follow same to Staunton 92 m., passing through Middletown, Woodstock, Harrisonburg and Mt. Crawford. Staunton to Roanoke 89 m., via Lexington and Natural Bridge. Roanoke to Winston-Salem 123 m. Winston-Salem to Charlotte 135 m., via Greensboro and Lexington. At Charlotte you can leave the New York-Atlanta highway going direct to Camden 79 m., via Pineville, Rock Hill and Lancaster. Camden to Columbus 33 m., via Blaney, Columbus to Augusta 76 m., via Batesburg and Aiken. Augusta to Savannah 132 m., via Waynesboro, Sylvania and Rincon.

The latter route, although quite a bit longer than the first one, has no section as bad as the Louisville-Nashville route and, although sections are not fully improved, it has one good point in favor of it—that is, it has considerably more tourist travel than the route across Kentucky and Tennessee. Accommodations, also, are more frequent.

Complete running directions are given on both of these routes in Volumes 3 and 4 of the Blue Book.

West Union, Ia.-St. Paul, Minn.

West Union, Ia.—Editor Motor Age—What is the best route from West Union to St. Paul, Minn.? Also give the distance between towns if possible. Also the route from West Union, Ia., to Chicago.—Subscriber.

Your route to St. Paul is a very easy one; in fact, you could make the run in a day. Go to Charles City 53 m., via Hawkeye, Fredericksburg, Williamstown and New Hampton. This is a part of the North Iowa

TYPICAL ROAD IN THE NEW BRUNSWICK WOODS

Pike. From Charles City go direct to St. Paul 158 m., via Osage, Lyle, Austin, Owatonna and Faribault. You will find the roads good natural dirt with considerable gravel in Minnesota.

In coming to Chicago your direct line naturally would lead through Dubuque and then across Illinois via Freeport, Rockford and Elgin. However, you will not only make better time, but have better roads and considerably fewer hills to come almost directly south to Cedar Rapids 85 m., via Oelwein, Independence, Walker and Center Point. From Cedar Rapids your route is practically straight east to Clinton 88 m., via Marion, Mt. Vernon, Clarence and De Witt. Clinton to Chicago 147 m., via Morrison, Sterling, Dixon, Rochelle and De Kalb. From Cedar Rapids to Chicago you follow what is known as the Iowa and Illinois divisions of the Official Transcontinental route.

Wichita, Kan.-Jacksonville, Fla.

Douglass, Kan.—Editor Motor Age—Please give us the best routing from Wichita, Kan., to Jacksonville, Fla. We want to start about November 1.—R. J.

Going north to Newton on the Meridian road a distance of 25 m., you will there take up the Santa Fe trail as far as Emporia, 84 m., via Peabody and Cottonwood Falls; Emporia to St. Joseph, 179 m., will be via Burlingame, Topeka, Holton, Horton, Troy. The Mt. Ayr highway will be your route from St. Joseph to Afton, 196 m., leading through Stanberry, Grant City, and Mt. Ayr. At Afton you will come upon the Blue Grass road which will be followed to Burlington and will guide you through Osceola, Chariton, Melrose, Albia to Ottumwa, 107 m.; Ottumwa to Burlington, 78 m., through Fairfield, Mt. Pleasant and Middletown. Crossing the Mississippi by ferry 17 m. above Burlington you will proceed through Monmouth, Galesburg, Farmington, Peoria, to Bloomington, 148 m.; Bloomington to Indianapolis, 185 m., via Hoopeston, Oxford, LaFayette, Frankfort and Lebanon.

Your itinerary from Indianapolis will be the same as that given in this issue in reply to an inquiry from St. Joseph, Mich., for route to Jacksonville, Fla. Should you prefer to follow the eastern route described therein you could connect with it by proceeding east from LaFayette via Burlington, Kokomo, Marion, Domestic, Mercer and Spencerville to Lima, a distance of 165 m.

The Blue Books which would give you detailed directions for this trip are volumes 3, 4 and 5.

September in Colorado

Colorado Springs, Colo.—Editor Motor Age—I note that Motor Age in answering inquiries for routing information frequently advises that it is not practical or advisable for the tourist to cross the mountains in Colorado later than the first of September.

As a matter of fact September is really one of the most delightful months of the year in Colorado. It is a month of light precipitation throughout the state and the roads generally are in as good, if not better condition, than any other season of the year. Tennessee Pass is always open throughout September although there may be occasionally light snow flurries in the higher altitudes though not enough to interfere with a trip.

There is throughout the east a general misconception of the fall and winter in Colorado. The usual idea of persons not familiar with the conditions is that as soon as the summer season is over Colorado is snow-bound until June of the following year. We are doing all we can to correct this impression and to give a true idea of climatic conditions during the winter months. We are more anxious than anyone else to see that the right conception is given and we do not feel that the statement that the roads across the mountains in Colorado are inaccessible is correct.—A. W. Henderson, Secretary Colorado Springs Chamber of Commerce.

Bellefontaine, O.-Deming, N. M.

Bellefontaine, O.—Editor Motor Age—We are contemplating going in our car to Deming, N. M., which is 60 miles from El Paso, and we are unable to locate people who know the route. Will Motor Age give us this information? We would like to communicate with someone who has been over the route. Our party will consist of two women, a 20-months-old child and myself in a Nyberg 42 tourabout.

Kindly give me the address of some people who sell lunch baskets for motorists.—C. E. Kelly.

In Motor Age of September 4 you will find routing to Deming, N. M., in the reply to H. F. Chorpening, South Haven, Mich., with whom you might communicate.

To connect with this route at Galesburg, run up to Lima, a distance of 54 m.; then west to LaFayette, a distance of 165 m., via Domestic, Marion, Kokomo; LaFayette to Bloomington, 118 m., via Oxford and Hoopeston; Bloomington to Galesburg, 97 m., via Tremont, Peoria, Farmington and Knoxville.

Volumes 4 and 5 of the Blue Book, which may be had at $2.50 each from the Automobile Blue Book Publishing Co., 910 Michigan avenue, Chicago, will give you running directions for your trip.

Hampers for motorists may be had from the following:

Amesbury Reed & Rattan Co., Bailey Bldg., Amesbury, Mass.

Bureck & Guerin, 161 W. 18th St., New York, N. Y.

Burlington Basket Works, Burlington, Ia.

Heywood Bros. & Wakefield Co., 174 Postland St., Boston, Mass.

Icy Hot Bottle Co., Cincinnati, O.

C. Seitz, 275 W. 128 St., New York, N. Y.

Waukegan, Ill.-Pittsburgh, Pa.

Waukegan, Ill.—Editor Motor Age—I contemplate a motor trip this fall from Waukegan, Ill., to Pittsburgh and Washington, Pa. I desire to go by way of Three Rivers, Mich., returning via Washington Court House, Ohio. Will you please outline the best route?—Dr. L. H. Tombaugh.

From Waukegan into Chicago 39 m., then to South Bend 100 m., via South Chicago, East Chicago, Highlands, Hobart, Valparaiso and Laporte. You will find stone road to Laporte; from there into South Bend it is pretty soft and poor going, largely due to the heavy motor car travel. South Bend to Three Rivers 47 m., via Mishawaka, Elkhart, Bristol and White Pigeon.

Continuing on your trip to Pittsburgh from Three Rivers, it is recommended that you come east about 10 miles to Nottawa and then go almost straight south into Ft. Wayne 66 m., passing through Sturgis, Howe, Kendallville and Huntertown. Ft. Wayne to Lima, O., 63 m., via Van Wert and Delphos. Lima to Columbus 89 m., via Round Head, Bellefontaine and Marysville. Columbus to Wheeling 135 m., via Granville, Newark, Zanesville, Cambridge and St. Clairsville. Wheeling to Pittsburgh 62 m., via West Alexandria, Washington and Cannonsburg.

On your return trip your shortest route is to come back over the same road to Zanesville, O., and then go direct to Washington Court House 86 m., via Somerset, Lancaster and Circleville. This latter is a good gravel road.

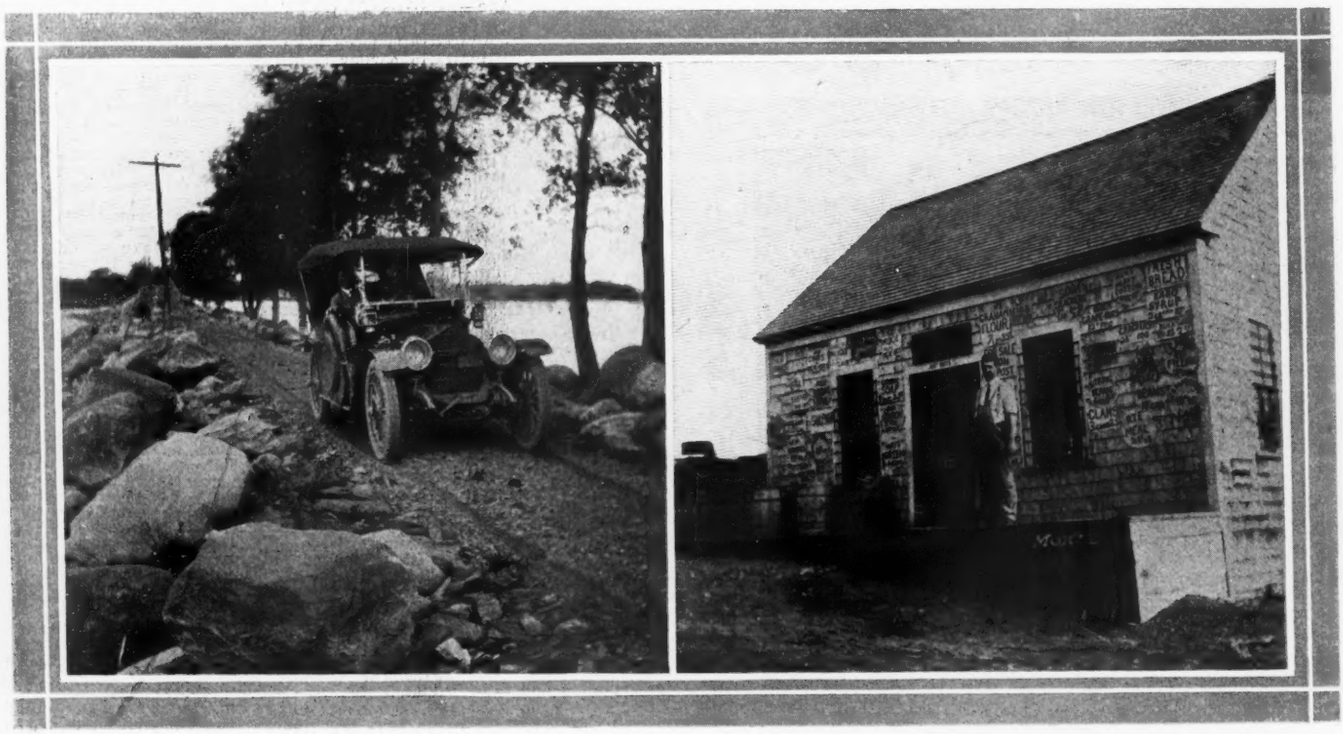
Continuing on your return trip you can go from Washington Court House to Dayton 45 m., via Xenia. Dayton to Indianapolis 108 m., via Eaton, Richmond, Cambridge City and Greenfield. Indianapolis to Lafayette 66 m., via Royalton, Lebanon, Frankfort and Dayton. Lafayette to Chicago 131 m., via Montmorenci, Wolcott, Remington, Rensselaer, Thayer and Crown Point.

Hampton, Ia.-Chinook, Mont.

Hampton, Iowa—Editor Motor Age—Please give us the best route from Hampton, Iowa, to Chinook, Mont.—C. F. Roemer.

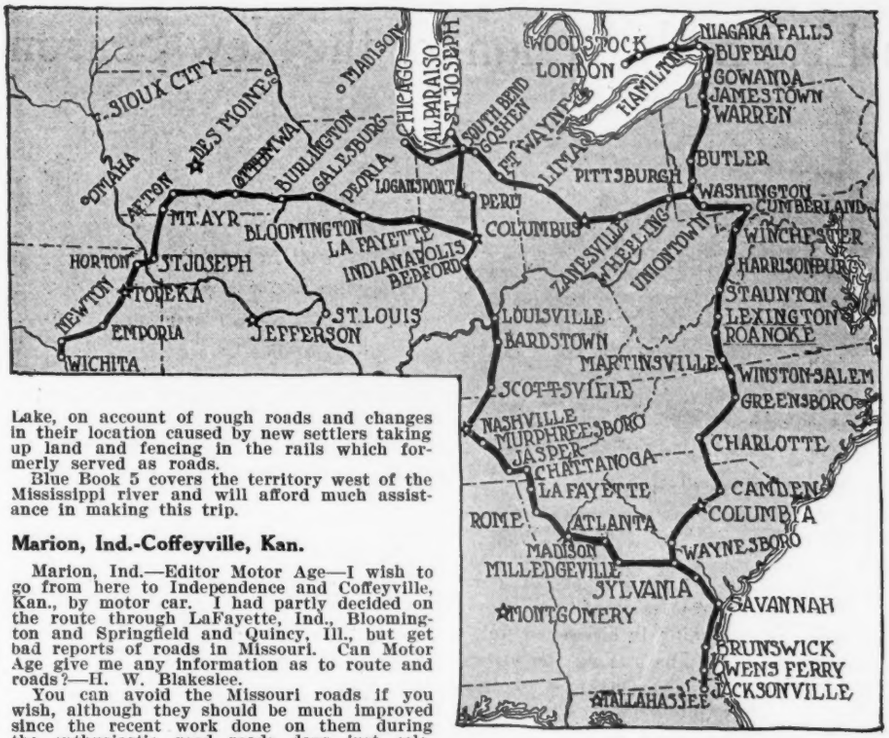
After going north to Mason City, a run of 107 miles over the North Iowa pike, a good, dragged, dirt road will take you to Spencer via Britt and Emmetsburg; continuing from Spencer to Sioux Falls over the same highway you will go through Sanborn, Hull, Rock Valley, Canton, 133 miles; Sioux Falls to Grand Forks you will travel 51 miles to Madison where you reach the Meridian road, continuing on this through Arlington, Watertown, Vernon, White Rock, Wahpeton, Christine, Fargo, Hillsboro, Reynolds and Merrifield, 340 miles; Grand Forks to Devil's Lake, 97 m., via Larimore, Petersburg, Mapes, Bartlett, Crary. Continuing west from Devil's Lake the route follows very closely the line of the Great Northern railroad, going 162 m. to Berthold via Rugby, Towner and Minot; Berthold to Culbertson, 167 m., via Williston; Culbertson to Malta, 187 m., via Poplar and Glasgow; Malta to Chinook, 69 m., via Harlem.

As Motor Age has often advised, it is not wise for one car to make the trip alone over this northern route, especially west of Devil's



ROAD ALONG LAKE CHAMPLAIN

GENERAL STORE IN WILDERNESS OF MAINE



MAP SHOWING ROUTES TO JACKSONVILLE, FLA.

Lake, on account of rough roads and changes in their location caused by new settlers taking up land and fencing in the rails which formerly served as roads.

Blue Book 5 covers the territory west of the Mississippi river and will afford much assistance in making this trip.

Marion, Ind.-Coffeyville, Kan.

Marion, Ind.—Editor Motor Age—I wish to go from here to Independence and Coffeyville, Kan., by motor car. I had partly decided on the route through LaFayette, Ind., Bloomington and Springfield and Quincy, Ill., but get bad reports of roads in Missouri. Can Motor Age give me any information as to route and roads?—H. W. Blakeslee.

You can avoid the Missouri roads if you wish, although they should be much improved since the recent work done on them during the enthusiastic good roads days just celebrated by 250,000 volunteers working on them two days. The following route will insure you more settled roadbeds: Going west from Marion to LaFayette, 73 m., via Kokomo; LaFayette to Bloomington, 118 m., via Oxford and Hoopeston; Bloomington to Burlington, 147 m., via Peoria, Galesburg, Oquawka; Burlington to Ottumwa, 78 m., via Mt. Pleasant; Ottumwa to St. Joseph, 230 m., via Russell, Osceola, Afton, Mt. Ayr, Grant City, Stanberry; St. Joseph to Kansas City, 83 m., via Atchison, Leavenworth; Kansas City to Independence, 195 m., via Edgerton, Ottawa, Colony, Chanute; and Coffeyville is only a few miles south of Independence.

In making this trip you would find the Automobile Blue Books, volumes 4 and 5 very helpful; volume 4 covers the Middle West, while volume 5 that section from the Mississippi river to the Pacific coast. The price is $2.50 each, and they may be obtained from the Automobile Blue Book Pub. Co., 910 Michigan avenue, Chicago.

London, Ont.-Jacksonville, Fla.

London, Ont.—Editor Motor Age—Kindly publish in the next issue of Motor Age the best road route from London, Can., to Jacksonville, Fla.—J. W. McLaughlin.

Running through Woodstock and Hamilton to Niagara Falls and over the new boulevard to Buffalo, proceed to Jamestown via Hamburg, Gowanda and Conewango; Jamestown to Pittsburgh will take you through Warren, Clarion and Butler; thence south from Pittsburgh to Beallsville, at which point you will reach the route described in this issue under caption St. Joseph, Mich.—Jacksonville, Fla.

Volume 1 of the Blue Book will give you running directions to Pittsburgh, and volume 3 will serve you for the remainder of your trip.

Bonaparte, Ia.-Kansas City, Mo.

Bonaparte, Ia.—Editor Motor Age—I wish to make a run from Bonaparte to Kansas City, Mo.—Roger N. Cresap.

Running to Farmington you will there strike the Waubonsia trail, which will be your best route westward, taking you through Mt. Sterling, Pulaski, West Grove, Centerville, Corydon, Leon, to Mt. Ayr; thence following the Mt. Ayr highway through Redding, Grant City, Gentry, Stanberry, Rochester, St. Joseph; thence to Kansas City via Atchison and Fort Leavenworth. Complete running directions will be found in Blue Book 5.

Casey, Ia.-Kansas City, Mo.

Casey, Ia.—Editor Motor Age—Kindly publish best route from Casey, Ia., to Kansas City, Mo.—S. Lincoln Rutt.

To reach Council Bluffs from Casey you should go through Anita, Atlantic, Avoca Neola; crossing to Omaha from Council Bluffs, continue through Plattsmouth, Nebraska City, Auburn, Verdon, Falls City, Hiawatha, Huron, Atchison, Leavenworth, Kansas City.

The Motorists' Bookman

Road Touring In Wales

AN examination of the excellent maps and a perusal of the discriminating gazetteers in "Road Touring In Wales," Reginald Weelbye's latest contribution to "The Roadfaring Guides" prompts admiration for the man who compiled the instructive and interesting data. In his carefully prepared maps Mr. Wellbye has designated the good, fair and impossible roads, the highways closed to motor cars and the specially bad hills, and has marked the places of historic and scenic interest—the relics of the Roman and Norman conquests, the ruins of medieval castles and prehistoric remains. "Road Touring In Wales" is published by E. J. Larby, London, and sells for 1 shilling 6 pence, or 37 cents, net.

The Gasoline Automobile

P. M. Heldt in his book entitled the "Gasoline Motor," which is volume 1 of a series under the one head "The Gasoline Automobile," has brought out a book on internal combustion engines for motor cars for use by engineers. Not only will engineers connected with the industry find this volume valuable, but the student at college who is aiming to become a motor car engineer as we know him today, will find amassed in this 500-page book enough information to lead him to work on ideas of his own. The motor car owner who has had a college education will gain much knowledge about the construction of his car and he will be better able to judge motor cars from a mechanical point of view.

The author takes every part of the motor car engine and describes the method of manufacture, the various designs and their advantages and disadvantages, he gives also the method of calculating the weights and dimensions of many parts, together with metal compositions and which metals are best suited for the work. Special chapters are set aside for the Knight and two-cycle motors, and although touched upon comparatively little, the author gives the reader a good idea of the design, construction and performances of these types. A special chapter on the testing of engines will be appreciated by a number of engineers. The book is from the press of the Horseless Age Co., New York.

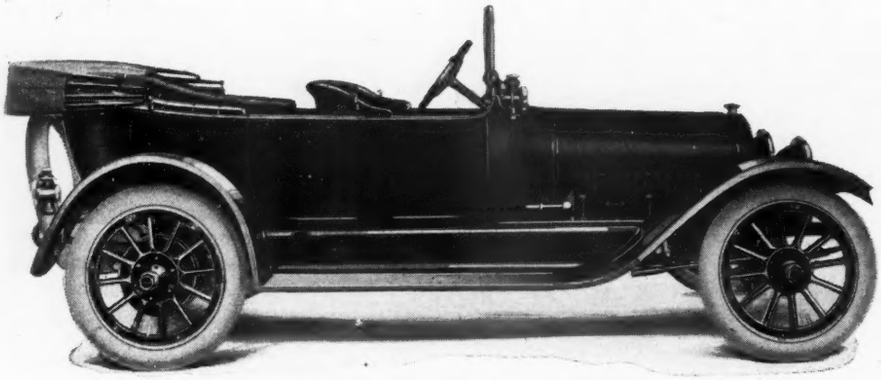
Traction Farming and Traction Engineering

"Traction Farming and Traction Engineering," by James H. Stephenson, M.E., is a practical hand-book for the owners and operators of gasoline and oil engines on the farm and comprises complete descriptions of all the leading makes of farm tractors with directions for their care and operation as well as special sections devoted to engines for water supply and electric lighting on the farm and threshing machines. It is fully illustrated with cross-section diagrams, line drawings and half-tones. The wonderful development of gasoline and oil traction engineering, and its adaptation to the needs of agriculture, has created a demand for a more extended knowledge of the details of construction and operation of these types of motors by their owners and operators, and Mr. Stephenson has gone a long way toward satisfying this demand. "Traction Farming and Traction Engineering" is from the press of Frederick J. Drake & Co., Chicago.

Commercial Relations of the United States

A concise volume, which contains statistics showing the foreign trade of each country of the world during 1911 compared with the previous year, has just been issued by the bureau of foreign and domestic commerce at Washington. This publication shows the principal articles and their value entering into the trade of each country and the itemization of the imports from and exports to the United States. The statistics were prepared by American consular officers and supplemented by other official data. In addition to trade statistics, the grain crops and mineral output of the principal countries are given, thus presenting in compact form the principal features upon which the commerce and industries of the foreign countries depend. The volume should prove highly valuable for reference purposes, having been revised and brought up to date so far as statistics were available. Copies of the book may be obtained from the superintendent of documents, Washington, D. C., for 35 cents each.

Buicks Show Stream-Line Body Design for the New Season



NEW BUICK FIVE-PASSENGER SIX-CYLINDER TOURING CAR

Showing stream-line body with tapered cowl and hood, also the clean running board and the new rear curved fender

1914 *BUICK FEATURES.*

Valve-in-head motor retained
New six-cylinder car of 3¾ inches bore and 5 inches stroke
Six body types on two chassis
A six and two four-cylinders
Streamline body a 1914 departure
New style rocker arms and camshaft rods

IN ADDITION to two four-cylinder chassis for 1914, the Buick line includes a six-cylinder touring car model. This car, as well as the larger of the fours, departs radically from the general outward appearance which has heretofore characterized Buicks, incorporating as they do the latest body fashion dictates. That is, the streamline effect is produced by a rounded top radiator and hood, the latter sloping to the cowl, which in turn rounds into the body proper. The smaller of the fours is practically a continuation of the corresponding model of last season, refined and improved throughout.

All of the new Buicks retain the valve-in-the-head motor construction, which has always been a feature of engines of this make. Electric cranking, lighting and ignition are incorporated in a combination Delco unit on all models as standard equipment, while left drive and center control replace right drive and control throughout the line.

Six Body Types

There are six body types offered, built upon the three chassis mentioned. The larger fours are designated as models B-36 and B-37, the latter being the touring car and the former the roadster. These replace models 30 and 31 of last season. Model B-38 is built upon the same chassis and represents the coupe, the first closed car to be brought out by Buick. The six is to be marketed with touring car body only and is called model B-55. Prices on the fours remain practically as they were last year, while the six is listed at $1,985.

Throughout all of these models, the same power plant design is evidenced, the only differences mechanically being in the size, although the smaller four has its gearset separate from the motor. The square 4 by 4-inch engine which was used in last season's larger fours has been dropped, however, and a bore of 3¾ inches along with a stroke of 5 inches adopted both for the new six and for models B-36 and B-37. The smaller fours retain the 3¾ by 3¾-inch motor used last year.

One of the two mechanical changes of any consequence is the new use of new style rocker arms and camshaft rods, having ball joints working in oil-soaked, felt-lined sockets. In thus making the metal work against felt, the operation of the joints is made noiseless. The other change is in the exhaust manifold, which instead of passing along the cylinders below the intake manifold, runs above them, making the carbureter much more accessible.

These motors, according to the S. A. E. rating, are much less powerful than their actual performances will show. Due to the fact that this formula takes in the bore only, both fours have the same rating of 22.5 horsepower, while the six is accorded 33.75 horsepower. But the block tests indicate that ratings of 27, 32 and 48 are more nearly correct, for the small four, large four and six, respectively.

Motor Details

Cylinders are cast in pairs and have integral cylinder heads. Both intake and exhaust valves open directly into the tops of the cylinders, the gases entering and leaving from the left side. The long valve rods are all on the right side, running straight up from the crankcase to the ends of the rocker arms which are pivoted on brackets bolted to the cylinder heads.

On the right side of the power plants, the combination Delco motor and generator is placed. This unit takes care of all three functions of cranking, lighting and ignition. It is located somewhat further back than was the magneto on last year's motors so as to be close to the flywheel for cranking purposes, and bolts to a bracket cast integral with the upper half of the crankcase. It is driven through an extension of the pump shaft in the conventional way.

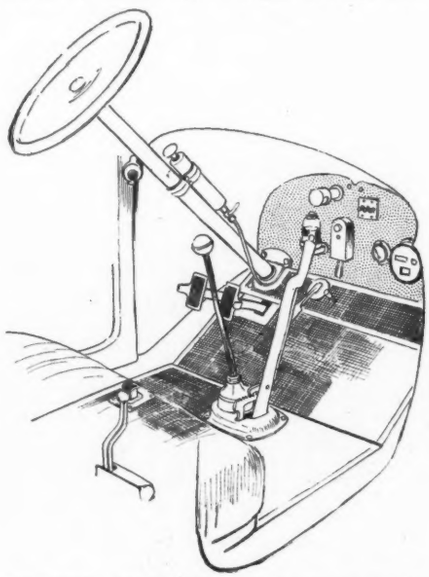
When operating as a motor to crank the engine, this electrical unit connects through a pinion with teeth cut in the outer rim of the flywheel, thus turning the crankshaft. On the forward end of the unit is a distributer which takes care of the ignition of the cylinder charges at the proper time. The gear reduction between the gasoline engine and the motor when cranking is 21.7 to 1 with the six and larger four cylinder engines, while an 18.5 to 1 ratio is used on the B-24 and B-25 models.

The usual method of cranking is employed with the new Buick system. After ignition switch has been thrown to the battery side, the cranking lever is pressed down. This meshes the electric motor gear with the flywheel teeth and at the same time sends electric energy from the storage battery to operate the motor.

Cranking and Lighting

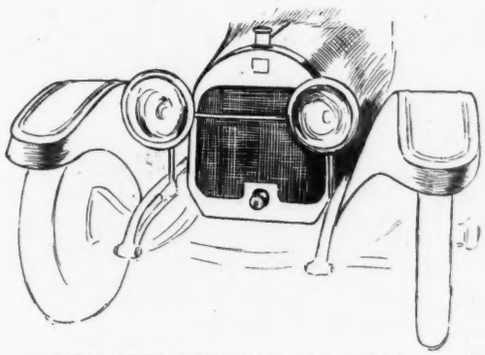
After the engine has started under its own power, the ignition switch is thrown to the magneto side. On the four-cylinder cars, the starting lever is located on the heel board of the front seat below the cushion, but on the six a pedal in the floor board is used. Their function is the same, however.

On all models, the electric equipment is of the single-wire, 6-volt type, with grounded return circuits. A smaller Delco unit is applied to the four-cylinder models than that used on the six. This is known as the Delco Junior, but operates in the same way as its larger brother. All models carry an Exide, three-cell storage bat-



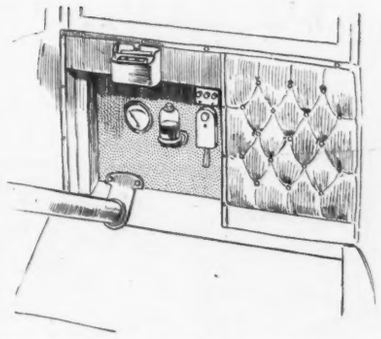
DRIVER'S COMPARTMENT OF NEW BUICK

The center control with the ball-handle shifter lever and the arrangement of the instruments and switches on the dash are shown. Note the location of the horn button on panel



BUICK'S NEW RADIATOR AND HOOD

The long sweeping curve of the hood to the dash gives a distinct streamline effect



ARRANGEMENT OF BUICK INSTRUMENTS

The tufting of the dash lends an air of elegance to the interior

tery in connection with this electric apparatus.

The storage battery is of 60 ampere-hours capacity, and when completely charged will light the head, side and tail lamps continuously for about 18 hours. When the starting pedal or lever is first pressed down, it closes a switch which sends enough current to the electric motor to turn its armature slowly. This allows the easy meshing of the train of gears which is shifted at the same time. Further downward pressure on the lever sends the full current to the motor, which then spins the engine.

Suitable cutout relays, ignition relays and resistance units are provided so that after the engine has started, the electric unit becomes a generator again and sends current to the storage battery until that unit is fully charged, and at the same time furnishes current for ignition.

Lubrication is taken care of by the same system in all of the 1914 Buicks. Instead of employing a sub-reservoir in the bottom of the crankcase as formerly, the engines are now lubricated by a splash system of the constant level variety with the oil circulated by a gear-driven pump operated by bevel gearing from the rear end of the camshaft. From this pump, there is a distributer pipe running along the inside of the crankcase from which each connecting rod splash trough is supplied.

Cooling of the motors is by pump circulation augmented by a belt-driven fan at the forward end. The radiators for next year are hung on trunnions and have new filler tubes ground to fit.

Cone Clutch Retained

The new Buicks retain the cone clutch. The cone is of aluminum and faced with leather, under which there are springs to make for easy engagement. The clutch surface area of the B-24 and 25 models is 102.6 square inches, while that of the others measure 119.3 square inches.

The same design of gearset runs through all models, that of the heavier cars having some of its dimensions larger where necessary. There are three speeds forward, selectively obtained. The ratio of the transmission gears is 3.36 to 1 on first, 2.23 to 1 on second speed and 4.32 to 1 on reverse. The gear teeth have a face width of ⅞-inch. The gearshift lever and the emergency brake lever are mounted directly on top of the gearbox, giving the center control feature. The H-gate gearshift has been replaced by a ball and socket joint type.

The drive to the rear axle is through a torsion-tube-enclosed propeller shaft. On the larger fours and the six a new type of front mounting of this torsion tube is used. The tube, terminating at its forward end in a yoke, connects to the back of the gearbox through this yoke and a gimbal ring. This allows greater freedom of the tube and axle, but at the same time maintains the alignment. The B-24 and B-25 models do not have this forward mounting of the torsion tube, but instead the tube has large ball ends fitted in adjustable sockets, attached to a frame cross member.

Buick Axle Design

The axles of the fours are now of the three-quarter floating type, much lighter and stronger than those formerly used. On the larger fours in particular, a 20-pound weight reduction along with a 50 percent increase in strength is credited to the rear axle. The axle shafts are of nickel steel, the entire load being carried on the axle tubes. The six has a floating axle, in which special care has been taken against oil leakage by special packing rings.

Brakes are of the ordinary type, internal expanding, and external contracting. The brake diameters are 12, 14 and 16 inches for the small fours, larger fours and six, respectively. Springs are larger than on former models, and are of double-heat-treated spring steel. The front springs are half, and the rear three-quarter elliptic.

Another departure from former design appears on the larger fours and the six in the placing of the fuel tank at the rear of the chassis and hung from brackets attached to the frame. The B-24 and B-25 models, however, retain the tank under the seat, feeding to the carbureter by gravity.

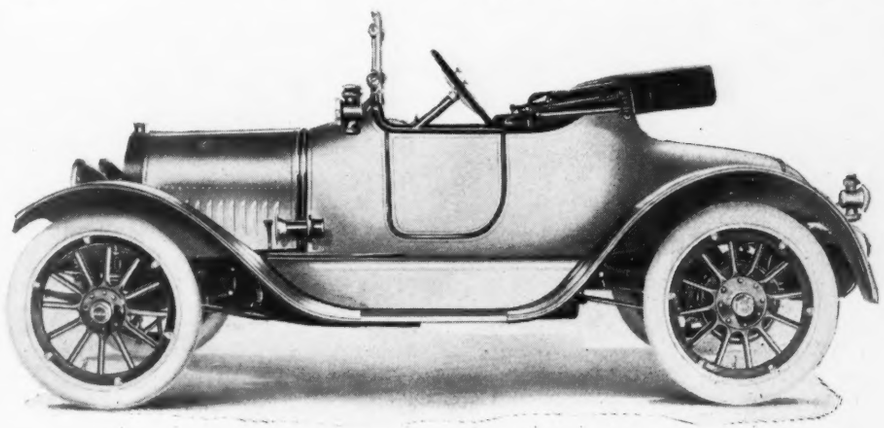
The wheelbase of the small model remains 105 inches, while that of the types B-36 and B-37 has been lengthened to 112 inches as compared with that of the 108 inches of models 30 and 31 of last year. The six has 130 inches wheelbase. The road clearance of the fours is 10 inches, while the six has 11 inches. This new six weighs 3,524 pounds.

Bodies Show Refinement

The bodies reflect careful consideration on the part of the designers of every feature of comfort and convenience for the passengers. Besides, they are up to the minute in design. The new fours and the six have a strictly stream-like appearance, which is accomplished by the new rounded hood and radiator.

The running boards are clear, having no battery boxes or other attachments on them. The bodies are of wood and metal construction with wide doors and very wide and deeply upholstered seats. A new style of rain-vision ventilating windshield sets off the cowl. The fenders also conform to the general designs, the rear fenders having a true curve to the wheels and extend down farther than heretofore.

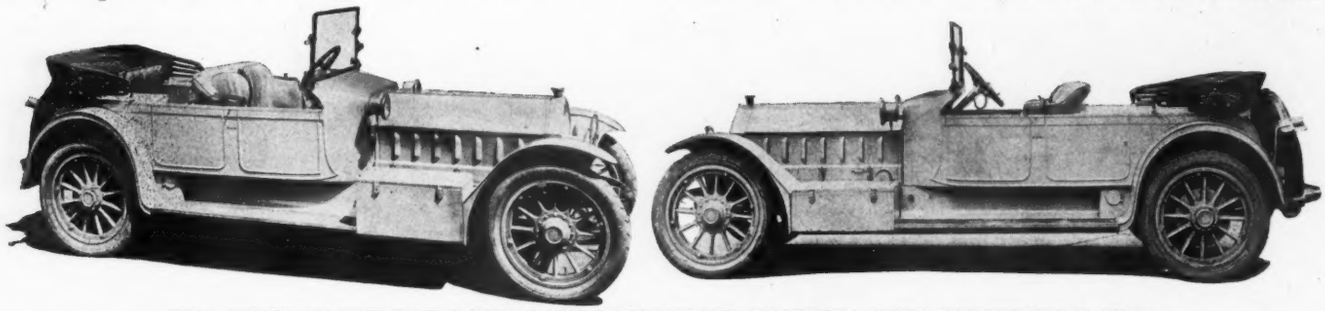
Equipment is complete on all models, a new type of tire bracket being fitted to the two larger cars. The brackets are made to clamp to the demountable rims so that no straps are required. At the same time, a much more rigid support of the spares is obtained by this method.



NEW BUICK FOUR-CYLINDER ROADSTER

The sloping rear deck and rounded lines of seat back with sloping cowl give a streamline appearance

Unique Steering Knuckle and Novel Bodies on New Marmon



TWO VIEWS OF THE NEW MARMON THREE-PASSENGER ROADSTER WITH DISAPPEARING SEAT

Body is decked over to the rear of the forward seat, directly back of which the deck may be opened in two parts, on dropping down and the other folding backward and forming the back of an extra seat

FOR the new season Marmon cars present no very radical changes from the past season's practice. The same two chassis models, the four-cylinder model 32 and the six-cylinder model 48, the models designating the S. A. E. horsepower ratings, are continued as the sole exponents of the Marmon line. There are a number of new body designs, chief among which is the three-passenger roadster fitted on the six-cylinder chassis. Also there are several refinements in the mechanical design of the two chassis.

Mechanical Changes

Chief among the mechanical changes is the novel type of front hub and steering knuckle on the six-cylinder car. This is more in the shape of a bullet than the common spindle shape and is so arranged that the vertical spindle is directly in the center line of the wheel so that steering is made easier and safer. The details of the new steering and hub arrangements are shown in one of the illustrations.

The motor itself is unchanged, but the cranking motor and lighting generator are located in a new position and are of a newer design of the North East system than those of the previous model. The magneto location as well is altered in that the new cars have a magneto at the rear instead of at the front, the idea being to provide greater accessibility for this mechanism. A motor-driven single-cylinder air-pump for tire inflation is installed as added equipment. The clutch of the four-cylinder car has been given a wider face and slightly different spring inserts, although the asbestos-faced cone type is retained. The brakes on the six-cylinder car have been increased in diameter from 16 to 17 inches and the brake adjustment fitted with a double worm screw design, which makes them quickly adjustable from the outside. A Zenith carbureter replaces the one used this year.

In general design the two chassis models are almost the same except for the larger motor and heavier construction throughout than the six-cylinder car. The single other departure is in the clutch where a dry disk type is employed in the six and a cone type in the four. With these exceptions a description of the four will serve for both chassis.

Motor dimensions of the four-cylinder engine are 4½ inches bore by 5 inches stroke, the cylinders being of the T-head pattern cast in pairs.

A special feature of the Marmon piston is the arrangement of the piston rings. There are six of these in each piston, although there are only two grooves. There are three rings in each groove, two of these rings are large, while the third is a smaller one serves the triple purpose of preventing leakage through the piston ring slots, holding the rings in place and also holding them out to give a bearing surface on the cylinder wall.

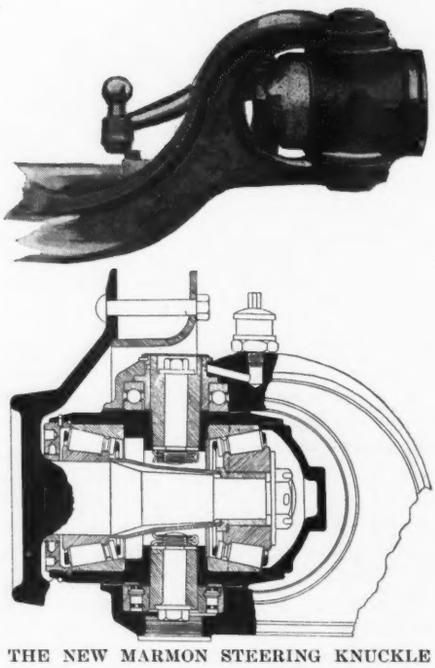
Electric lighting and cranking as applied to the Marmon cars are not accessories in any sense of the word, the motor having been designed to accommodate the new North East system so that it is quite as much a part of the power plant as the carbureter. On the same side of the four-cylinder motor as the carbureter and oil pump is mounted a compact motor generator driven from the crankshaft by a silent chain inclosed in a protected housing at the flywheel end. This generator charges the storage battery and supplies current for the lighting. It also serves to start the engine when operated on current from the storage battery as a motor. This is accomplished by turning a switch on the dash. When operated as a generator the drive from the crankshaft is direct but when operated as a cranking motor it transmits power through a compact gear reduction giving a ratio of 40 to 1. In the six-cylinder motor the cranking motor generator is at the forward end of the engine and drives through the timing gears.

Ignition and Oiling

Ignition is provided by a Bosch two-spark system, current being supplied by a high-tension magneto for service running, and by a battery for starting and emergency purposes. Two sets of spark plugs are employed, the T-head cylinders permitting the most advantageous placing of these plugs, that is, directly over the valves. The ignition control switch on the dash permits of using either one or both sets of plugs with either the battery or magneto.

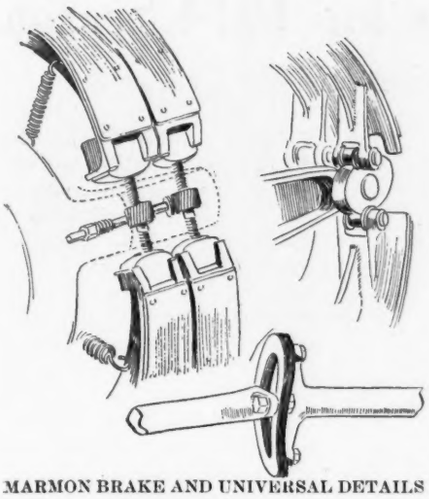
Lubrication of Marmon motors is a continuous circulation of oil automatically fed under pressure by means of a gear-driven oil pump which delivers the oil direct to the inside of the bearings through a hollow crankshaft. In the six-cylinder motor the system is extended to the camshaft bearings by carrying the oil through a hollow camshaft. In both motors the main supply is carried in an aluminum reservoir bolted to the bottom of the crankcase.

In this reservoir is a filtering chamber formed of a circular gauze screen formed of a fine mesh. The intake of the pressure pump which is placed vertically and driven by spiral gears from the inlet camshaft opens into this chamber at a point that permits of the settlement of sediment so that only clean oil is circulating. Oil is led to the wrist pins through copper tubing attached to the connecting rods. The system is identical in principle in both the Marmon 32 and 48, in the former oil is delivered directly to the three main bearings and is distributed to the crank and wrist pin bearing centrifugal force



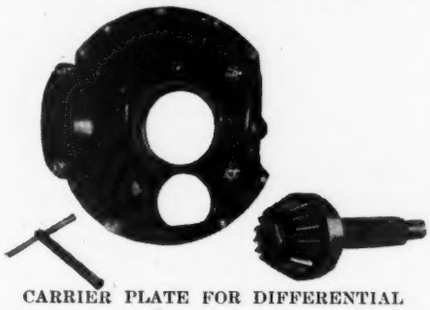
THE NEW MARMON STEERING KNUCKLE

The upper illustration shows the bullet shape of the knuckle and the lower one its construction



MARMON BRAKE AND UNIVERSAL DETAILS

Above, two views of the worm screw brake adjustment. Below, novel design of universal



CARRIER PLATE FOR DIFFERENTIAL

Illustrating the worm screw adjustment for the bevel pinion from the outside

throwing a sufficient supply to the pistons and cylinder walls.

New Marmon Six Motor

Circulation of cooling water is provided by use of a centrifugal pump on the right side of the motor and driven from the same shaft as the magneto. The radiator is of the honeycomb type and is supplemented by a high-speed fan of unusually large diameter.

The clutch on the Marmon 32 is a simple aluminum cone faced with an asbestos fabric friction surface and directly engaging the flywheel. Under the fabric are adjustable relieving springs which make smooth engagement. The gearset is a unit with the rear axle and the power is transmitted from clutch to gearset through a propeller shaft with a double universal joint and the three point flexible support and the positive circulation of lubricant over all its bearings permit the motor to be set at a slight inclination. This permits the employment of a novel type of universal. As shown in one of the sketches, this consists simply of a series of hollow circles of sheet metal bolted at opposite sides to either end of the shaft. The very slight movement required by the straight-line drive is taken up by the flexibility of this device and there is no need for lubrication or chance of friction.

Separation of power plant and gearset into two distinct units has been a Marmon feature for many years. The motor and clutch constitute one unit while the gearset and differential combined on the rear axle constitute the other.

Three speeds forward are provided controlled through a central lever with a ball-top handle. This operates in the conventional H-slot. Operating rods are encased in a tube attached to the torque tube which protects the propeller shaft.

Marmon Floating Axle

The axle is of the floating type in which the weight of the car is carried by the axle housing. The squared end of the driving shaft is free to move longitudinally in the differential but is attached firmly to the driving wheel. In fact, these are bolted through their integral flanges directly to the wheel hubs.

Both sets of brakes are placed side by side so that they are inclosed by steel drums bolted to the wheels. Both sets of brakes are of the internal expanding type and have an aggregate braking surface of between 400 and 500 square inches.

An unusually simple and effective method of adjustment has been worked out. This consists of a screw adjustment for varying the throw of the cam to take up wear and also a right and left hand worm and trunnion block adjustments of altering the location of the brake shoes with relation to the drums. The brake shoes hinge on these blocks so that by turning the worm one way or the other the shoes may be made to approach or recede from the drum face.

The Marmon six motor has cylinder of 4½ bore with 6 inch stroke with cylinder cast in pairs and is rated according to the S. A. E. horsepower formula at 28 horsepower, but when desired the motor speed may be increased to a point at which it will deliver a maximum power over 50 per cent in excess of its official rating.

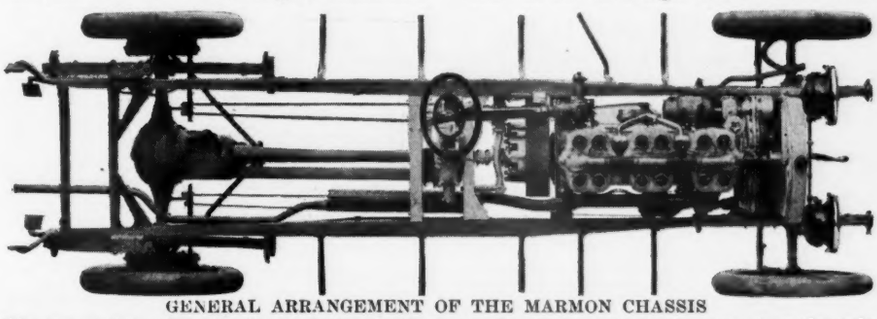
In the clutch design is shown the chief variation from the layout of the four-cylinder car. In the six-cylinder a dry plate clutch has been employed with polished steel disks for one member and asbestos on a wire mesh foundation for the other friction face. With the wheelbase of 145 inches, it would be found difficult to handle in city streets except for an ingenius front axle design that not only permits of turning this long car in a comparatively short radius but also makes for safety in steering. The axle proper is a one-piece drop forging with heavy yoke ends, these yokes set in a recess in the front wheel hubs so that the load is carried on a vertical spindle directly in the center of the wheel itself, minimizing the effort.

Body Types of Marmon

The two-passenger roadster type fitted to either the 32 or 48 chassis is designed to afford the racy lines of the roadster without the limitations of luggage carrying usually found. The body has a turtleback deck, where there is added carrying space for luggage.

One feature of the new line in the way of bodies is the three-passenger roadster fitted to the 48 chassis. The forward seat carrying the driver and a passenger is conventional and the body is decked over to the rear of the forward seat directly back of which the deck may be opened in two parts, one part dropping down into the body immediately back of the driver's seat and the other part folding backward and downward and forming the back of an extra seat 21 inches wide.

There are two features of the lighting equipment, one of which applies to all the Marmon cars and the other to the touring cars only. On all the cars the lamp which lights the forward compartment and instrument board is not located on the cowl or dash but is under the forward edge of the front seat so that the rays of light are directly on the face of the instruments. An automatic step light is fitted at the tonneau door. This illuminates the step.



GENERAL ARRANGEMENT OF THE MARMON CHASSIS

The square tube alongside the propeller shaft carries the shifter rods to the gearset on the axle. The tire irons are practically an elongation of the frame

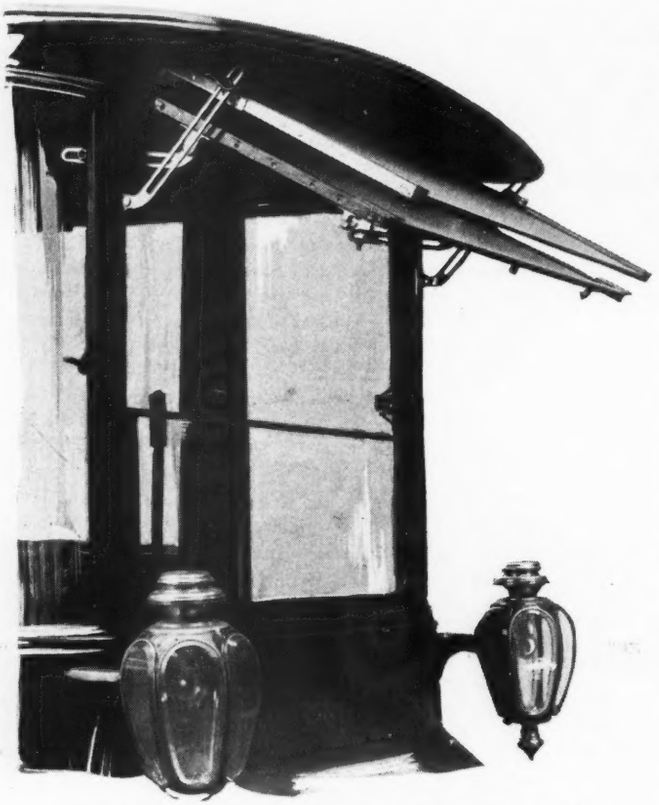
SIX-CYLINDER LIMOUSINE

The seat on the right folds back to make entrance easy

Details of Refinements in the New Cars for 1914 Season

Hanlon Window and Worm Drive on Detroit Electrics—Stearns' New Carbureter

THE Anderson Electric Car Co., maker of Detroit electrics, has secured the patent rights to the Hanlon car window and has developed a special form of construction under this patent which is part of the equipment of all 1914 cars. As shown in the illustration, this new window consists of two upper glass panels, one outside the other, and both hinged at the top. These may be fixed in any desired position by the hand-clamp brackets on the sides. The inner glass may be adjusted from within the car. When protection against snow or dust is desired, the inner glass can be lowered, but this does not become blurred because the outer glass is in a tilted position to catch the snow or rain drops and keep them from the inner glass. In no event is the driver's view of the road obstructed by the glass panels, for his line of vision comes below their lower edges when either the outer alone or both are in tilted position as seen in the illustration, which opens up the front of the car in the usual way. When the protecting window is brought all the way down, it keeps the regular front window from frosting in the winter time.

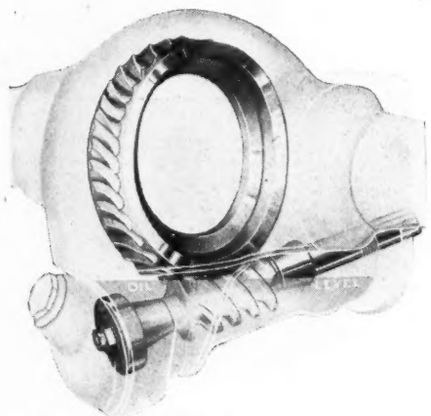


HANLON WINDOW ON NEW DETROIT ELECTRICS

Detroit electrics also will have worm-driven rear axles for 1914. After several years' experimentation, the concern has adopted the Lanchester-Daimler type of gearing with the worm mounted below the ring gear, as shown in the phantom diagram.

The Lanchester worm is not a straight type, but is of the hour-glass design, being formed so as to partially embrace the circumference of the worm wheel. The teeth of the wheel also are concaved to conform to the threads of the worm.

The question of proper lubrication has a very important bearing on the subject of worm drives, and in placing the worm below the wheels the Anderson company believes that it has insured perfect and positive lubrication. In its position, the worm runs constantly in a bath of oil. Suitable annular and thrust bearings are provided, the fact that end thrust is much greater in a worm-driven than in a bevel-driven rear axle being recognized in the special thrust bearings. The ring gear and worm together with the differential and necessary bearings may be taken out as a unit when necessary.



LANCHESTER-DAIMLER WORM DRIVE ON DETROIT ELECTRICS

TRIBUNE DOUBLE HEADLIGHTS

A novel feature of the new Tribune 36 is a double electric headlight, combining the functions of sidelight and headlights by means of two bulbs in each. The larger bulb, of 16 candle power, is located conveniently in the apex of the reflector, while the smaller bulb, of 6 candlepower, is just beneath. It is claimed for this arrangement that greater efficiency is obtained especially in the smaller candlepower headlights.

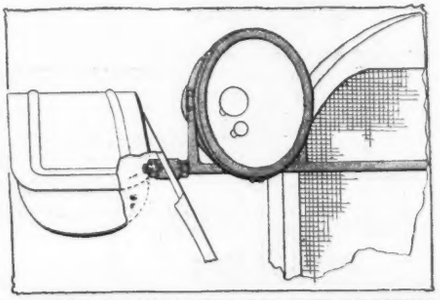
Current for the lights is supplied from a storage battery charged by a generator driven by the engine.

THE F. B. Stearns Co., Cleveland, O., started 30 days ago fitting a new design of carbureter to its four-cylinder and six-cylinder models. It is a design conceived by L. G. Petre, of the Stearns company in collaboration with the engineers of the Stromberg company which is manufacturing it.

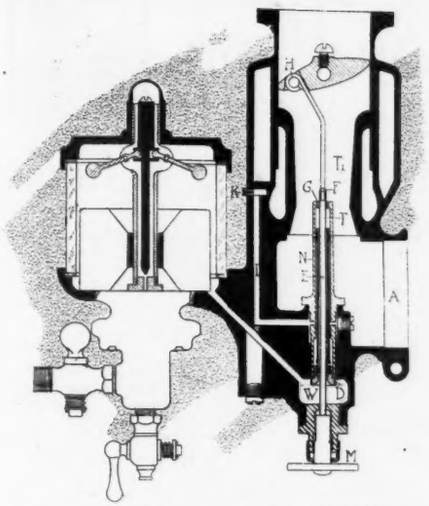
This carbureter is entirely free from springs of any nature and is without auxiliary air valve. Its air passages are as free and unrestricted as possible permitting of high air velocity and the only obstruction in it is the butterfly throttle. It is owing to these conditions that from 5 to 6 miles per hour higher speeds are obtained with this carbureter as compared with previous ones used. The four-cylinder car runs 12 miles per gallon with it, and the six-cylinder 9½ to 10 miles per gallon.

The vertical section of the carbureter, shows the main air inlet A which is connected with a hot-air pipe from the exhaust manifold. This pipe having an adjustment to give cold air in proportion as desired.

The gasoline system consists of a long nozzle end fed from a well W at its base, this well receiving its supply through a diagonal passage from the base of the float chamber. Extending through the center of the nozzle is a long tube T designated as the low-speed adjusting tube. It is secured at its lower end to the adjusting nut N. At its upper end there telescoped with this tube another tube T1 carried in the throttle at which point it has an opening H, and also at its lower end an opening F. The gasoline rises from the well W past a gasoline reducer D which surrounds the tube T leaving an annular space through which the gasoline can rise around the tube. The fuel continues to rise and has two passages by which it may reach the motor, one through



DOUBLE HEADLIGHTS ON NEW TRIBUNE DOING AWAY WITH SIDE LIGHTS



INTERIOR NEW STEARNS CARBURETER

the center of the tube T and through the tube T1 to the space above the throttle for idling when the throttle is closed; and the other for running speeds. When it rises in the space around the tube T and issues through the series of holes E in the top of the nozzle.

The operation of the carbureter for idling when the throttle is entirely closed as illustrated, is as follows: gasoline from the well W rises past the reducer and enters the tube T through the hole F and continues to rise through the tube T1 and escapes to the motor through the opening H above the throttle. A supply of air enters through the small hole F located immediately above the top of the tube T.

As soon as the throttle is partially open the tube T1 is lowered and telescopes within the tube E, thereby entirely shutting off the small air hole F at the lower point of the tube T1. At this time the main nozzle opens at E and the top of the nozzle comes into play, and the idling tube T1 practically ceases operation. To relieve the vacuum in the float chamber immediately after the throttle is opened and permit the gasoline to flow immediately an air vent K is used. From it the air passes through the core passage I and thence around the nozzle.

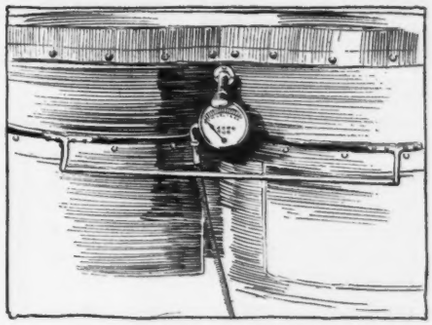
This carbureter has but two gasoline adjustments, the first is the idling adjustment at the nut end, which by turning the low-speed adjusting tube A can be raised or lowered as desired. With the throttle closed the hole F is almost, if not entirely, above the top of the tube T so as to permit sufficient air entering to furnish the idling mixture. The position of the hole F may be seen by removing inspection plugs located in the carbureter walls at this level but not shown in the section. These plugs also serve to secure the Venturi tube in its proper location.

The second gasoline adjustment is with the reducer D, which is a small sleeve threaded into the carbureter casting at the base of the nozzle. A series of sleeves designated by number is furnished, each leaving a different annular space between it and the tube T for the gasoline to rise through. In properly adjusting a carbureter to a motor these sleeves are changed until the correct running adjustment is obtained.

SPEEDOMETER IN TONNEAU

A decidedly new idea in motor car equipment was evolved by a recent purchaser of a Lozier six who ordered the speedometer placed on the rear of the front seat, facing the occupants of the tonneau. The owner of the car, a Montreal man, employs a chauffeur and always rides in the rear seat when in the machine. He has his own ideas as to what speed should be maintained in city traffic and therefore had the speed indicator placed where it should be under his gaze.

As a result, the chauffeur is forced to depend either upon instinct or hints from his employer for a knowledge of the car's pace. In placing the speedometer in the tonneau a special tube over six feet in length was used owning to the distance of the rear dial from the front wheel.



SPEEDOMETER IN TONNEAU OF LOZIER

Among other novel ideas on the car dictated by the owner is the placing of the electric horn midway between the two headlights in front of the radiator. Two push-buttons near the tonneau door are connected with the electric horn and the speedometer light, so that the owner is able to apprise pedestrians of the car's approach, in case the driver fails to give warning in time.

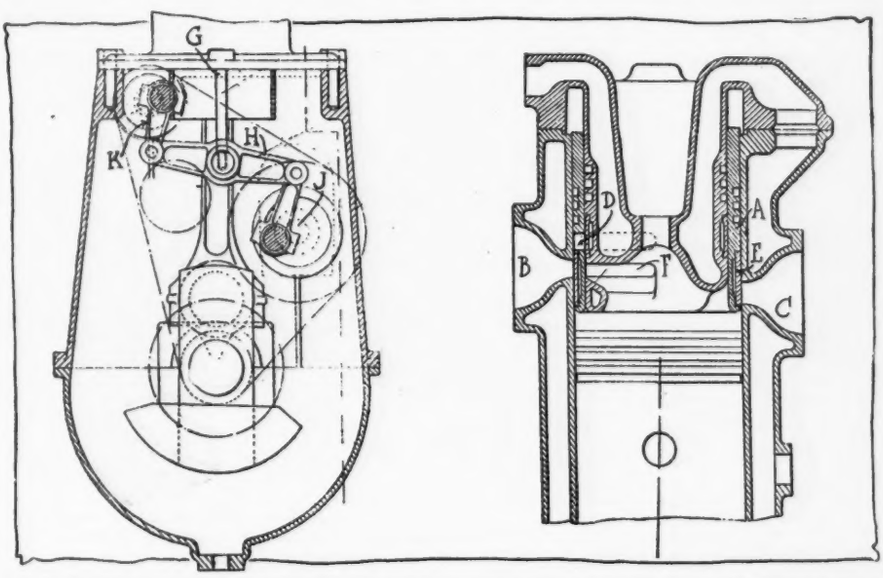
Knight Invents Cuff-Valve Engine

DURING the past few weeks there have been issued in England two very interesting patents relating to motor cars to Charles Y. Knight, of sleeve-valve engine fame.

Hitherto, Mr. Knight's inventions have been more closely associated with engines having "sleeve" valves extending the full length of the cylinder. The patents referred to relate to engines in which the sleeves are considerably shortened, being, in fact, mere "cuffs" surrounding the trunk head. The Autocar, of England, publishes sketches and detail of the new design which are reproduced herewith.

In the right illustration it will be noticed that the sleeve A does not lie between the piston and cylinder wall, but merely reciprocates in the recess between the cylinder wall and cylinder head. The gas enters the cylinder through a passage B on the one hand whilst exhaust takes place through the outlet C, the sleeve being raised to uncover the latter passage and dropped so as to bring the port D into register with the inlet B. The "cuff" A is provided with a single broad packing ring E, which seals both the passages B and C during inlet and compression.

The method of operating the "cuff" is dealt with in another patent and is illustrated at the left. To the "cuff" at each side is attached a rod G, and these rods project down into the crank chamber carrying at their lower ends the pivots of rocking levers H. Each rocking lever is coupled by links to eccentrics or cranks on to shafts J and K driven by a single chain from the crankshaft. The shaft J rotates at half the engine speed.



UPPER AND LOWER PORTIONS OF KNIGHT'S CUFF-VALVE ENGINE DESIGN

The Realm of The Commercial Car

Drives, Brakes and Steers on Four Wheels

Jeffery Truck Designed to Fit U. S. Army Requirements—Remarkable in Design of Running Gear

Chassis of 1½-ton four-wheel drive truck. The steering connection to the rear wheels is through the long tube T. Interchangeability of driving and running gear is a feature which makes it adaptable for military service

DRIVING, steering and braking on all four wheels is a feature of one of the most remarkable truck designs ever produced in America. This four-wheel drive, four-wheel steer and four-wheel brake truck is the product of the Thomas B. Jeffery Co., Kenosha, Wis., and is to be known as the Jeffery truck. This unique design is the result of an attempt to meet the requirements of the United States army, the specifications calling for 1½-ton vehicle with 20 percent overload capacity that would go anywhere with its load that a four-mule team could pull. The application of the propulsion to each of the four wheels was decided upon to give the vehicle the best tractive power in deep sand, extreme muddy roads and on steep hills.

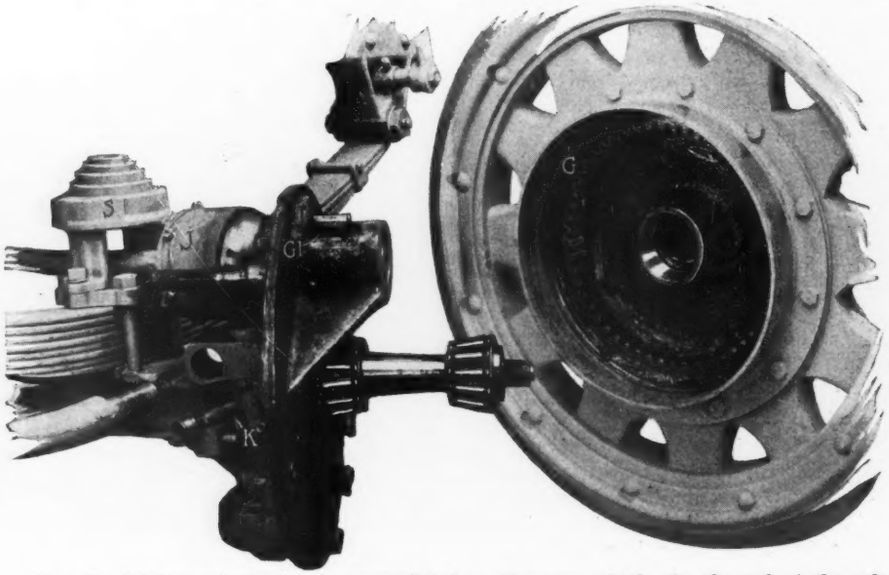
Of Rugged Proportions

In the Jeffery truck many of the European ideas have been incorporated as four-wheel drive has been developed to a greater extent in Europe than it has in America. With a design which would permit the quadruple drive it was not difficult to provide steering at both front and rear and to provide braking facilities at each end. This gave the advantage of a shorter turning radius with the four-wheel steer, better braking effect with the four-wheel brakes and what is, if anything, more important, particularly for army use, a complete interchangeability of parts of the running gear. This latter factor will be gone more into detail later.

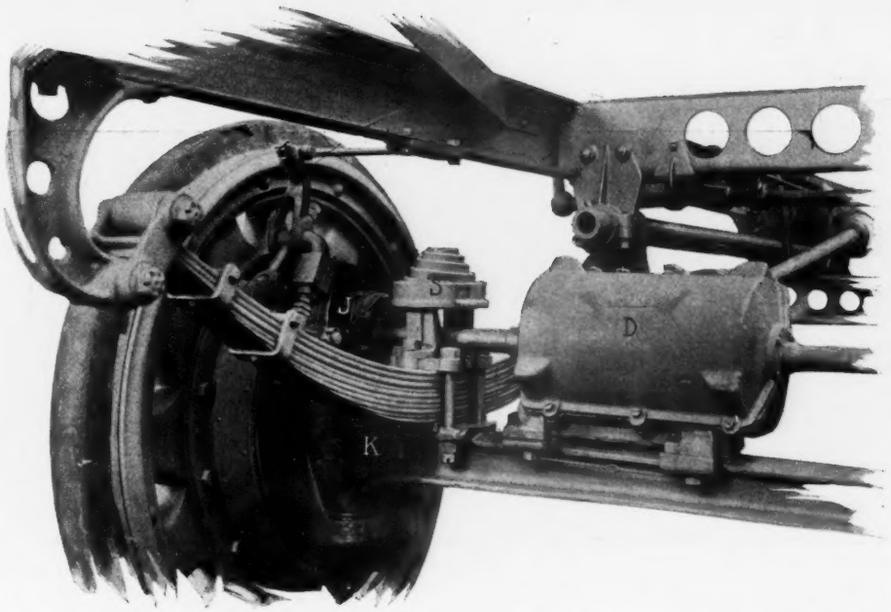
As a result of the effort to build a truck which would stand up under the most exacting military service, the vehicle is of much more rugged proportions than are the ordinary trucks of the same capacity and the fact that it is built for abnormal service should prove a recommendation for it to the general truck buyer when it is put on the market.

The Jeffery Power Plant

So far as the power plant is concerned, it is of the usual type, and, if anything, somewhat smaller than is ordinarily employed for vehicles of this kind. The motor is of four cylinders cast in block, 3¾ by 5¼ inches in cylinder dimensions. The motor bearings are somewhat larger than ordinary. The camshaft is operated by spiral gears and special attention has been given to provide large water space in the cylinders so that uniform cooling of the cylinder walls is insured with a Bosch magneto and Rayfield carbureter under the hood in a conventional way, power is transmitted to a Borg & Beck single-disk clutch. This clutch is of somewhat novel design, and consists of a single ring of raybestos interposed between the flywheel and a single steel plate on the transmission shaft. Against this steel plate is a second raybestos ring and behind it is a compression ring which carries wedges. Toggles with roller ends are carried in the sheet metal cover plate and these rollers release the clutch as they move downward on the wedges when the pedal is pressed. The feature of the clutch is the adjustment, which consists of two small nuts outside of the cover plate. These are moved inward or outward for ad-



How the driving and steering is accomplished on the same wheel. On the end of the axle shaft is the universal J connected to the pinion G1. This meshes with the internal gear G in the wheel and the whole mechanism turns on the steering knuckle K, the universal turning 30 degrees. The bumper S protects the axle shaft and steering arm in case of spring breakage.



Axle and wheel of Jeffery four-wheel-drive, four-wheel-steer, four-wheel-brake truck. Upon the dead I-beam axle is mounted the differential D and from it run the live axle shafts through the legs of the bumper S to the universal J. The steering knuckle K is on the end of the dead axle and directly above it is the swivel connection from the brake rod which permits the wheel to turn without affecting the braking facilities

justment. The statement of a Jeffery engineer that he adjusted the clutch for slippage in 20 seconds speaks well for its accessibility.

From this clutch the drive is through a mainshaft with universal joint at either end to the gearbox, which is supported amidship upon a cradle formed by the crossmembers of the frame. The gearbox provides four speeds forward and the drive in the gearbox is through a lay shaft to the propeller shaft in which there is incorporated a Wayne equalizer. All of this is within the gearset housing.

From the end of the propeller shaft, driving shafts run forward and backward, one to the rear axle and the other to the front axle with universal joints at either end of each. These shafts are so arranged that they are at an angle of about 4 degrees downward from the gearbox when the truck is under load.

Front and rear axles are alike in every respect and are of the double type, that is, the wheels are carried on a stationary I-beam axle which corresponds and is somewhat similar to the front axle of the ordinary car. Above this is the live driving axle which clears the main axle by a sufficient amount to provide room for spring movement. Upon the dead axle is mounted a differential and from it extends the axle shaft whose outer ends carry spur pinions which mesh with an internal or annular gear on the driving wheel. The pinion is mounted on the steering knuckle and each shaft is provided with a universal joint which permits an angle of 20 degrees in the shaft. This permits a very sharp turning angle such that even with its wheelbase of 125 inches the truck can turn within a circle of 45 feet diameter. The casting of the wheel housing is chambered out to permit the internal gear ring to be mounted with its inner edge just under the center of the tread. This permits the driving torque to be transferred to the wheel very close to its line of action and gives a direct application of the power.

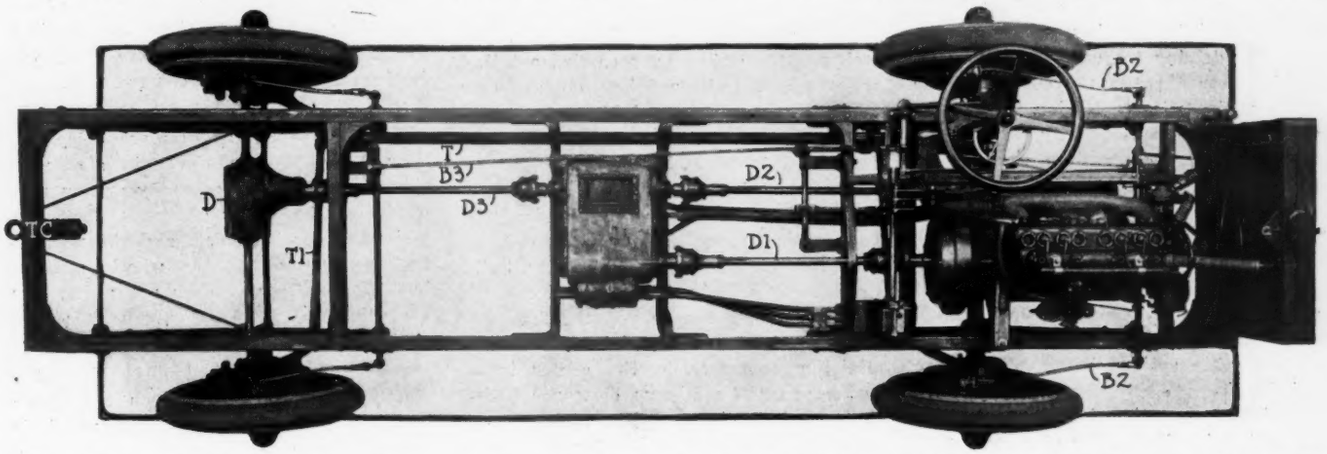
The entire wheel assembled is completely housed and is provided with a felt washer to keep in the oil and to keep out the dirt. Universal joints at the ends of the axle shaft are covered with a steel housing and knuckles, wheels and pinion are mounted on roller bearing, the knuckle having a thrust roller bearing at its lower end. The gearset and differentials are ball bearing.

Rear-Wheel Steering

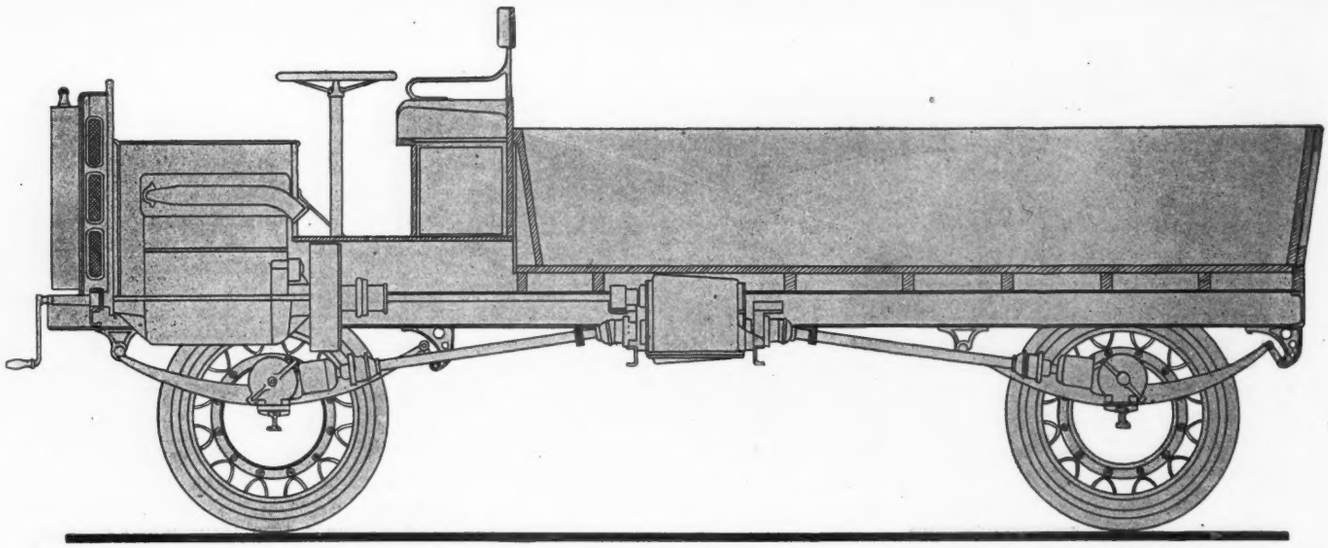
The steering arrangement at the rear is a duplication of that at the front and is conventional except that from the steering column a long longitudinal tube runs to the rear, where it connects with a drag link running across the chassis to the right knuckle. The steering gear is of the Lavinge type with a vertical column located on the left side.

It will be noticed that there are three differential joints in the driving system, one on the gearset and one in each axle. The employment of the Wayne type of equalizer which has a feature of driving the wheel which is pulling the hardest, that is, which has the traction, instead of the idle wheel makes it certain that there will be tractive effort in one wheel even if all the other three were slipping. The provision of the intermediate equalizer in the gearset is to properly distribute the power between the front drive and the rear drive just as the equalizers on the axle distribute the power between the two wheels on that axle. The gearshift is provided with an interlock so that no two speeds can be in mesh at the same time. All the wheels are cambered and the axles slant forward to give a caster effect for ease in steering.

The brakes themselves are of the ordinary contracting band type, the only difference in the connections from usual construction being in the location of the



Plan of Jeffery chassis, showing how the power is transmitted from the motor through the main driving shaft D1 to the gearset, thence to the differential on the front axle through the shaft D2 and to the differential D on the rear axle through the shaft D3. Likewise the steering of the rear wheels is effected through the longitudinal tube T to the cross arm T1. Braking on the rear wheels is accomplished through the rod B3 and on the front wheels through the two rods B2. At the rear is the coupler TC for a trailer



Jeffery truck with military escort body showing the drive to the front and rear axles from the gearset in the center. When the truck is loaded these secondary driving shafts from the gearset are at an angle of 4 degrees with the frame. They have universals at either end

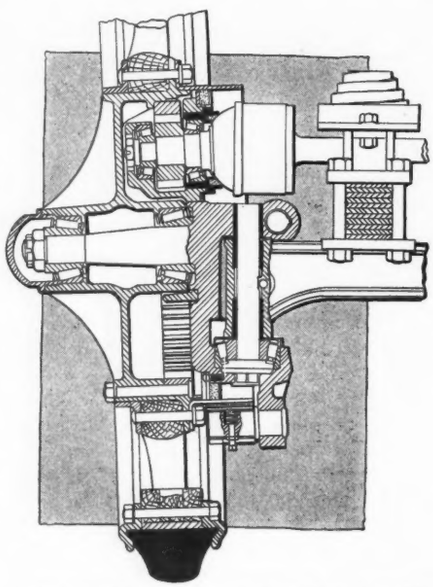
brake arm pivot. This is a swivel joint and is located vertically over the steering pin so that the braking is not interfered with when the wheels are turned. The pedal and lever connections are so arranged that when the pedal is pressed the foot brakes are applied on all four wheels, but the hand lever remains stationary. However, when the hand lever is operated, the foot pedal is moved, in addition to the application of all the brakes. This is intended to give the driver a double pressure in case of an emergency. Tests by the factory have shown that with the truck empty at a speed of 15 miles per hour it can be stopped in 8 feet.

May Be Used as Tractor

The frame is 200 inches in length and 38 inches wide. It is 5 inches deep, 2 inch flange and of 3-16 inch heat treated steel, reinforced with gussets at the corners. The vehicle is intended to be used as a tractor at times and the center of the rear cross member of the frame is fitted with a spring eye coupling for attachment of the trailer. The frame at this point is reenforced by diagonals so that the pull from the coupling is all taken by the side member.

All the driving torque and braking effort is taken through the springs; there are no radius rods or torsion tubes. The spring lugs are consequently very heavy and the springs themselves are electro-silico-manganese steel, 2½ inches wide by 3 inches deep and are 52 inches between spring eyes. Directly underneath the frame upon each I-beam axle is mounted a coil spring bumper. This is mounted upon a base which straddles the live axle shaft and serves to protect the latter in case the main springs break. These are semi-elliptic.

Particular attention has been paid in this design in the matter of distribution of the weights. The motor is set 5 inches to the right of center, while the gearbox is a little to the left of center, both being so disposed that the center of gravity is in the median line of the chassis. So well has the design been carried out that when the car is weighed on all four wheels separately the weight does not vary 25 pounds.



Cross-section of the complete wheel assembly, showing the drive through the universal joint to the internal gear on the wheel and the roller bearings of the spindle and the steering king pin

Car Speed, 14 M. P. H.

A car speed of 14 miles per hour is obtained at 1000 r. p. m. of the engine. The gear ratios range between 8 to 1 on fourth or high and 32 to 1 on low. Solid tires are used, 36 by 4 inches in size. With this wheel size the top of the frame is 35 inches from the ground loaded and the minimum clearance in the center is 25 inches and the minimum clearance under the axle is 15 inches. The motor is set very high and the carbureter and magneto are set above the crankcase so that the car may negotiate very deep water without stalling. Along with left drive center control is provided.

To prevent damage to the radiator from road shocks it has a sort of three point suspension, being mounted at each lower corner upon spring plungers while the horizontal rod which extends from the upper edge to the dash has a spring connection.

Interchangeability and Accessibility

Two features are predominant in the design of this truck, both of them are important from a military standpoint. One of these is the exact duplication of parts and the other is extreme accessibility. For instance, the four wheels are interchangeable, so the four driving axles with their universal joints, the propeller shafts, the three differentials and the four brakes. As this reduces very materially the number of spare parts required it is a valuable feature where continuous operation is needed at a distance from the base of supplies.

As to the accessibility, the gearbox is an example. Any one of the shafts with its gears can be taken out and replaced without touching the rest of them. The end caps may be removed when three bolts are taken out and to these the bearings are attached so that both the shaft and its bearings are pulled out together.

The removal of twelve bolts frees the differential case on either axle and four bolts liberate the axle shafts so that the whole axle assembly or any part of it can be lifted off for replacement while the car is loaded, and the removal and replacement of the wheels requires but 15 minutes and does not necessitate unloading.

A very neat idea where rapid work is required is the method of holding the starting crank handle. Upon the frame is mounted a clip on a pivot which is held normally against the frame by a spring during cranking, but when the motor is running extends out to catch the engine, the clip flips back automatically out of way.

The Motorist's Kindergarten

EDITOR'S NOTE—Motor Age is publishing in this department a series of non-technical explanations of the various parts of motor cars for the benefit of the reader who knows nothing about them. The subjects will be dealt with in the most elementary manner, so that the series when completed will form a simple elucidation of the car.

IN the last Kindergarten article the suspension of the motor car was explained and it was stated that the springs are fastened to the frame and that the latter may be either above or below the axles. It also was shown how the springs are fastened to the axles. The frame suspension employed today is almost universally of the overslung type, but the construction of the frame and the material used may differ in all the types whether over or underslung.

Frames may be constructed of wood, metal or a combination of both. The best example of a wooden frame may be seen on the Franklin car. It is one of the very few motor cars employing this type and the advantage claimed for it is that it is strong and absorbs road shock to a great extent. A little experiment will prove this. If one were to take a bar or steel and with it strike a rock, the shock transmitted to the rod would be enough to hurt one's hand, but if the same rock is struck with a piece of wood of similar size and shape as the steel, much less pain will be felt. It is due to the shock absorbing qualities of the wood.

Channel Section Used Mostly

The majority of cars of today employ metal frames of the channel section. That is, a cross section would appear like a square with one side cut away. Many claims are made for channel frames, but they have come into wide use because

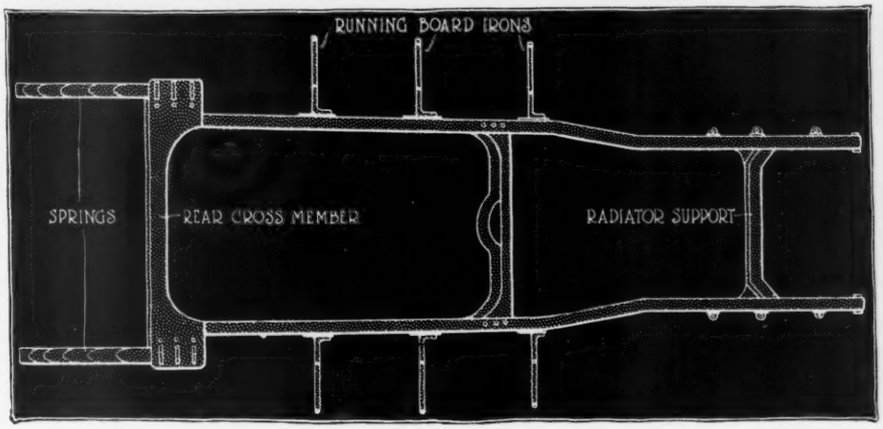


FIG. 87—TOP VIEW OF A MODERN FRAME

Note that the frame tapers toward the front. This is to give a greater turning radius for the wheels. The motor is suspended in this by three or four points. In the former case one point is within the radiator support

Types of Modern Frames

of the ease with which the rest of the motor car may be attached. Frames may assume various shapes, but the conventional form is illustrated in Fig. 87. It will be noticed the side members of the frame come together as they approach the front. This narrowing-in gives a greater turning range for the front wheels and thus makes steering easier. In Fig. 86 are shown three types, the upper one illustrating a frame for an overslung car. There is a slight kick-up, as it is called, near the rear of the frame. The kick-up in the rear permits of the clearing of the rear axle housing and also allows for the construction of a nearly straight line drive from the motor to the axle. This is a much desired feature. In the center illustration in the same figure is shown a frame with a double drop. This type is in use on a large number of taxicab coupes in Chicago and New York. This construction permits of an exceedingly low floorboard and also lowers somewhat the center of gravity of the car.

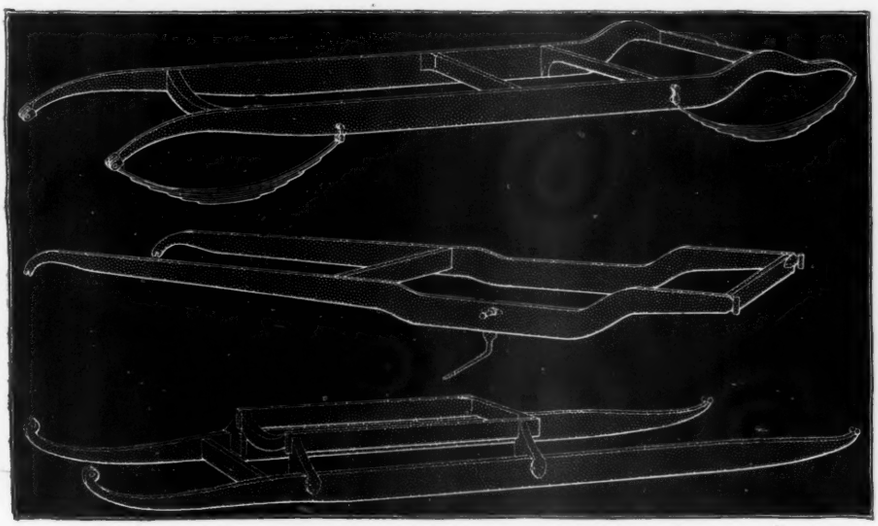


FIG. 86—THREE TYPES OF MODERN FRAMES

Upper illustration shows the conventional type of overslung frame in which there is a kick-up in the rear. The center picture shows a double drop frame which permits of the body being hung low. The lower illustration is one form of underslung frame. Here the motor is suspended from a separate frame often called a sub-frame

Cross-Members Riveted

In the two upper illustrations it will be noted that there are several cross-members attached to the frame. These are riveted to the side-members and made to support the motor, clutch bracket, radiator and now some makers are using them also for supporting the battery and cranker.

In a number of cars the motor is suspended from three points and in others by four. In the three-point type the center of the front part of the motor is made to pivot in the front cross-member and the other two ends fastened by brackets usually to the side members of the frame. In the four-point suspension there are extensions on the motor crankcase and these are bolted to the side members.

In the lower illustration in Fig. 86 is shown the underslung frame construction in which the motor is carried on a separate frame above the main frame. Sometimes this separate frame for the motor is used also in overslung construction. It is referred to as a sub-frame.

The Readers' Clearing House

ELECTROMAGNET OPERATING VOLTS

Size of Wire and Number of Turns Are Factors—Reversible Magnetos

SACRAMENTO, CAL.—Editor Motor Age—Give diagram for making coils for recharging magneto magnets, the size of the wire, how much should be used, and how it should be wound.

2—Could these coils be connected to a 110 volts direct current circuit? If not, how should it be stepped down?

3—What companies make reversible magnetos for six-cylinder reversible gas engines?—Loftus L. Doyel.

1—This was given in Motor Age issue of February 20, page 35.

2—If one wishes, an electromagnet may be designed to operate at any given voltage, the size of wire and number of turns varying with the voltage.

3—The Splitdorf and practically all makes of magnetos on the market are offered by the maker in types which may be operated either clockwise or counter clockwise. However, if you mean a magneto which will give a spark at the proper time and run in either direction while in the motor, we would say that the Remy Electric Co. did market such a type, but has discontinued its manufacture.

THE EVOLUTION OF THE MOTOR CAR

Few Companies Do Not Change Their Models Yearly

Sauk Center, Minn.—Editor Motor Age: I am convinced after much reading that the motor car is in a state of evolution at this time, so to speak. There are but few, if any, companies which do not change their models yearly for clear reasons, among which are imperfect mechanical designing, improper distribution of metal in the various parts which have shown weakness, and general design to increase sales.

Last year was fraught with much change in this great industry and history records twenty-five failures in the makers' world. Too much waste and poor designing, with the resultant loss in sales has been the real cause of these changes. There are others to follow in the near future, while there are others, too, who will engage in the manufacture of a certain style of motor car and place it upon the market with hopes of high success, while it is more than probable that some of these will fail and some will succeed. It is to be most sincerely hoped that some of the old tried and true makers will not make such radical changes as to kill the sale of their cars, but will make such sane and practical changes as will make these cars much sought after and really more practical in the users' hands. One company is hesitating at this time as to whether it will adopt wire wheels as standard or merely optional in the 1914 equipment of its cars, while another equally strong and stay-here company is about to place the sloping hood over their engine for standard style. To be frank, I, personally speaking, do not favor either wire wheels or the sloping hood, as in my opinion we users do not want either. The wire wheel is all right in its place on a racing machine, as is the sloping hood in France or other foreign countries, but give me the present style of wooden wheel and straight-line body, which also includes hood.

Casting about for more fields to conquer will most certainly bring on a gigantic combination of a few of the leaders in motor car manufacture, resulting in a standardization of all parts pertaining thereto, lowering of prices and a driving out of business all these wildcat makers great improvement of this colossal industry and then we will come into what is our due. Really, some of the concerns today who buy up parts and stick them together, assemblers, should be driven from the legitimate business, as we all know that to buy a standardizaed car with the ability to be able to get any part which may be required when wanted, is just what we drivers and users so much desire.

For many long years the bicycle was undergoing a sort of evolution in its life and resulted in producing a good wheel at a moderate price, with the ability to buy any part to repair it with the certainty of a perfect fit. It also resulted in driving out of the makers' realm all of those experimental concerns which were a real curse to the trade, making a far better wheel at a much lower price. I once bought a wheel for $85 cash wholesale and had to propel around 51 pounds of material while I can buy nearly three better bicycles which only weigh about 20 pounds each for this same money.

Again comes the six-cylinder machine with its greatly increased torque over the four, and still it is on the wane, owing to its complexity and excessive use of high-priced gasoline. The people want only practical, every-day machines at a moderate price and upkeep, with standardized parts, straight-line body, built-in cranker, square motor, considerably reduced in power, lighter, better tires, and all of these at the lowest possible cost.

A stroll through a plant today emphasizes most fully the position I have assumed, and one can readily see what the aim of the makers is at this stage, in one, if not the greatest, industries in the whole world, practicability, standardization, price.—A. D. Carpenter.

Questions Answered and Communications Received

Loftus L. Doyle.....Sacramento, Cal.
A. D. Carpenter..Sauk Center, Minn.
Harry E. Sipe.....New York
A. P. Southworth...Wakefield, Mass.
George A. Burton.....Milwaukee, Wis.
One in trouble..Great Falls, Montana
Thomas D. Murphy.....Red Oak, Ia.
A Reader.....Monticello, Ark.
C. B. Herring.....Ottawa, Ill.
William Kiene.....Savannah, Ga.

No communication not signed by the reader's full name and address will be answered.

CONCERNING MOON FLOATING AXLE

Housing Is Made of One Piece of Steel-Timken Bearings

New York—Editor Motor Age—I would like to have information and description of the Moon floating rear axle.—Harry E. Sipe.

The Moon floating rear axle within the housing is illustrated in Fig. 1. The feature of this axle is the one-piece crucible steel housing. The tubes which connect the housing with the drums are forced into place under 6-tons pressure and then fastened with eight rivets. The differential is mounted on Timken bearings. The standard gearing of the driving pinion to differential bevel is as 15 to 53. There are four spider pinions in the Moon differential, these being made of nickel steel. The axle shafts are said to be of chrome-vanadium steel and are fastened to the wheel by a flange on the end of the driving shaft. By moving the bearing cages various differential adjustments may be made.

PEUGEOT A PIONEER CAR BUILDER

Sold as a Pleasure Car in Europe—Eight-Cylinder Cars in Use

Wakefield, Mass.—Editor Motor Age—The Grand Prix article in Motor Age, issue July 17, states that no race was run in 1911. That statement conflicts with a statement in the Fiat catalog which says that V. Hemery in a Fiat won the 1911 French Grand Prix.

2—Is the Peugeot a popular pleasure car in France or simply a racing car?

3—It was stated in a recent issue of Motor Age that the "Chicago agent of the Studebaker claims a speed of 55 miles per hour for the model 35." The most I can get is 40 miles per hour but it certainly eats up the hills. Why is this?

4—Where is the 1911 Vanderbilt winning Lozier now?

5—What is the direct drive gearing on the Blitzen Benz?

6—What motors are used in the Staver, Moline and Henderson cars?

7—What is the greatest number of cylinders ever used on a motor car?

8—It was stated in a recent issue of Motor Age that the Hudson used a Continental motor. In the Buda advertisement it is stated that the Hudson was one of its users.—Arthur P. Southworth.

1—The 1911 race was a grand prix, but it was not the important race of the year.

2—It is sold as a pleasure car.

3—The speed of 55 miles per hour was made with a car from stock and accurately and properly adjusted. It is probable that your motor is not tuned up for high speed work.

4—In the hands of a private owner in Milwaukee, Wis.

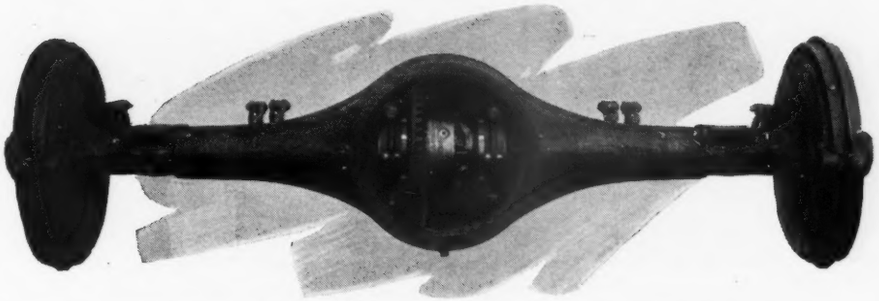


FIG. 1—FLOATING AXLE OF THE MOON CAR SHOWING ONE-PIECE HOUSING

5—On fourth speed the gear ratio is 1 to 1.

6—The Staver uses the Teetor motor, the Moline uses a motor made by the Moline company and the Henderson the Buda motor.

7—Eight. A number of companies abroad are marketing cars with eight-cylinder motors, the DeDion Bouton being one of them.

8—The Hudson uses a Continental motor and has used it for some time past.

POOR COAST CAUSES HUMMING NOISE

Differential Adjustment Will Cure It—Gears May Be Out of Round

Great Falls, Mont.—Editor Motor Age—What is the cause, also the remedy, for grinding noise in the transmission of my Winton Six, model 13, when cutting down the power? When the engine slows down there is a grinding in the gears, which is not noticed when the engine is pulling.—One in Trouble.

It is taken that the noise of which you speak is heard when the gears are in high and the car made to coast. The condition is termed a bad coast in the differential and may be remedied by adjusting the differential. The cause may be given as improper meshing of the driving pinion and differential gear. If adjustments are made and instead of having a bad coast there is a humming sound heard at definite intervals there is an out of round on the drive. It is better to have a poor coast in the rear end than to have a poor drive as little coasting is done. If the gears are very badly out of round the bad coast may not be cured except by gear substitution.

If one is not familiar with making differential adjustments Motor Age advises that the car be taken to the company's service station as expert hands only can do this work properly.

FRONT AXLE SPINDLE IS BROKEN

Believes Accident Due to Crystallization of Steering Part

Red Oak, Ia.—Editor Motor Age—While driving my 1910 Chalmers 40 a few days ago, the front axle spindle broke squarely in two between the bearings, and the wheel rolled away down a hill. Fortunately the car was just coming to a standstill to let a passenger out, and no serious damage was done. It is easy to see, however, that had this car been running at even a moderate rate of speed on a country road it would most certainly have been overturned. I had examined this spindle not a great while ago and it showed no defect whatever. It had never received a hard blow and never been put to any excessive strain so far as I know. The car had been driven about fifteen thousand miles.

What I would like you to advise me is whether there is any possible means of inspection whereby one could have determined the condition of this part and thus forestalled the dangerous break by replacement. The break was as clean as a piece of glass, due, no doubt, to crystallization. Undoubtedly the part had not been properly tempered.—Thomas D. Murphy.

It is not very often that steering crystallization takes place and it seems a difficult matter to determine whether the metal has crystallized. Since this condition hardens the metal to such an extent that the metal becomes brittle, a fair test would be to try to file the part. If it is thought that one part of the steering has crystallized, take a file and run it across the part on the opposite side, which is supposed to be made of the same kind of metal. Then with the same file try the suspected part. The file will make an impression on the defective piece only with difficulty, but easily on the unaffected part. In the laboratory the extent of crystallization is determined with a powerful microscope, so the above seems a simple way which may help. Metal crystallized may be converted to its original state, or nearly so, by heat treatment, the method depending upon the amount of carbon in the metal.

TWO HORSEPOWER FORMULÆ GIVEN

Modified S. A. E. Considers Stroke Directly—Speed of Stutz Six

Monticello, Ark.—Editor Motor Age—Which is the latest formula for finding horsepower, the S. A. E. or the A. L. A. M.? Do either of these consider the stroke?

2—What is the maximum speed of the Stutz six series E touring car?

3—What is the actual horsepower of it?

4—Was the Stutz car used by Anderson at Elgin a stock car?

5—If not, where did it differ from the regular four-cylinder stock car?

6—What company makes the transmission for the Overland car?—A Reader.

1—That formula, known as the S. A. E., and formerly called the A. L. A. M. formula, does not consider the stroke directly. It is expressed thus, horsepower $= \frac{D^2N}{2.5}$ in which D is the bore of the cylinders, in inches and N the number of cylinders. The denominator 2.5 is a constant which has been found to work out best. This formula is based on a piston speed of 1,000 feet per minute.

There is another formula which has come into wide use, and it is known as the modified S. A. E. formula. This was gotten up by Motor Age and is expressed, horsepower $= \frac{D^2 \times N \times S \times R}{15{,}000}$, in which D is the bore in inches, N the number of cylinders, S the stroke in inches and R the revolutions per minute of the motor. It is seen that this formula considers stroke directly.

2—The Stutz six series E is guaranteed to show at least 60 miles per hour.

3—On the brake test the motor shows 60 horsepower.

4—The car driven by Anderson was not stock.

5—The general design of the car is the same as that of the stock car, but the dimensions of the parts are much different, the bore and stroke are larger, the valves of greater diameter, etc.

6—The Willys-Overland Co. makes the gearset for the Overland car.

SPEED OF ABBOTT-DETROIT MODEL B

Car Capable of Traveling 48 Miles per Hour—Gear Ratio

Milwaukee, Wis.—Editor Motor Age—What is the bore and stroke of the Abbott-Detroit 1912 model B 30 horsepower?

2—What is the gear ratio?

3—The maximum speed of the car?

4—The minimum speed on high gear.—George A. Burton.

1—The bore and stroke of the Abbott-Detroit model B is 4 by 4¼ inches.

2—The gear ratio 3½ to 1 on high.

3—It is stated that this car is capable of traveling 48 miles per hour.

4—The Abbott-Detroit B can be throttled to 4 miles per hour.

DRAGGING BRAKE INJURES TIRES

Extra Load Would Tend to Shorten Life—Excess Work for Motor

Ottawa, Ill.—Editor Motor Age—What effect has a dragging brake upon the pneumatic tires. Does not a dragging brake cause more friction between the tires and the ground with a consequent increase in the wear of a tire?

2—Does not a dragging brake bear a resemblance to a heavy load in a running car, outside of the downward weight, as far as the wear of tires is concerned?—C. B. Herring.

Dragging brakes will increase tire wear slightly due to the fact that the free movement of the wheel is retarded. More harm is done to the motor, from brake drag than to the tires. The motor is made to do excess work and in cases where the dragging is great the motor will heat quickly.

Every time the brakes of a car are applied there is wear on the tires to some extent, and since the dragging brake acts somewhat as a brake, it may be said that there is tire wear.

2—Yes.

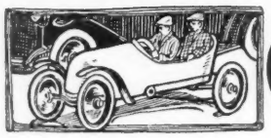
GEORGIAN'S MAGNETO OUT OF TIME

Peculiar Knock May Be Due to Preignition

Savannah, Ga.—Editor Motor Age—I am having trouble with my Champion magneto. It uses no circuit breaker and the last repairman who had it said something about "it breaking the magnetic lines of force instead." It worked all right until 2 years ago when it began missing. Since then it does not fire when advanced and misses when run slowly.

There also is a knock in the engine which nobody has ever located. It knocks every revolution of the camshaft and does not occur regularly except when going at a rather fair rate of speed. When running idle with the throttle nearly closed it hits on and off but if the second cylinder is cut out it hits regularly. —William Klene.

Possibly the magneto is out of time. Resetting the magneto so that it fires may cure missing and knock both, which may be an ignition knock.



Cyclecar Development

Evolution of America's Latest Motor Vehicle

By William B. Stout

THOUGH America took up the cyclecar movement 6 months ago no firm is as yet actually making deliveries to customers nor will in all probability to other than agents before early spring. To the layman waiting anxiously for a chance to buy a cyclecar—and there are thousands of these—the reason for the delay and long period of waiting is not apparent, but to the manufacturer and engineer it is easily understood.

There are many stages of development to be gone through with before a cyclecar can be ready to be manufactured, the machine itself being but a small part, and it is a reason for wonder that several firms have gotten as far as they have in so short a time as this. That they have is due to the fact that the original layout of the car was on right lines and needed little change to fit it to manufacture, and that they had a business organization all ready.

Building First Cyclecar

To understand all that the prospective manufacturer has to go through with, suppose that you were going to build a cyclecar and intended to manufacture it for profit. You get together a friend or two and all put up the money to build the first car, the engineer of the bunch designing the machine from his study of the magazines chiefly, as none of the number has seen a machine in fact. The drawings finished, the work is started in a local machine shop or garage. The parts are few, the construction simple. The drive is by belt and all parts are standard. The car has the usual 36-inch tread and you say at once that three weeks' time will see the car on the road.

You order all your parts by mail. You get the body coming through, the bearing housings, the steering knuckles, the various patterns, etc., and the hand forgings. You spend all your time on the job and at the end of 6 weeks the material is just about ready to start putting the job together. The big pieces go together quickly. Then come the small fitments, the control pieces, the levers, the brake fittings and springs—the thousand and one parts that are added at the last minute. The fender irons have to be drawn, and the lamp brackets fitted, a scheme for the number plates and a fastening for the gas tank. A little casting costing 10 cents may hold you up a week, and at the end of 6 months your car is ready to run. It is put on the road for a day or so and is then ready to come in and be made all over again.

The car has demonstrated the speed, comfort, reliability, etc., of the cyclecar and your enthusiasm brings support. A few weeks of business and you have a small company formed—perhaps some lawyer by now holds the stock—and start the second car, using the first as a demonstrator until you pull the parts from it to make the second car. This car takes 6 weeks to make. Then a third is made and this is a basis for manufacture.

While this has been going on a business organization is being developed and this is just as tedious and expensive a job as making the car, often more so. The first organization will need change, some men will fit, others not; some will last a week and some a year, but the organization takes time and money. This organization has parts ordered for fifty cars. These are coming through as fast as they can be had. Some firms you order from will hold you up on deliveries, and you will seek a change to some other firm that can deliver promptly. Others will hold up on price, and again you seek a change. In this way you develop the buying organization, and find what firms you can do business with and what not, and where you are dependent on certain firms for your deliveries. In these cases you plan to make those things yourself for no outside firm must control your product. You must be able to get anything you need at any time.

Developing the Sales End

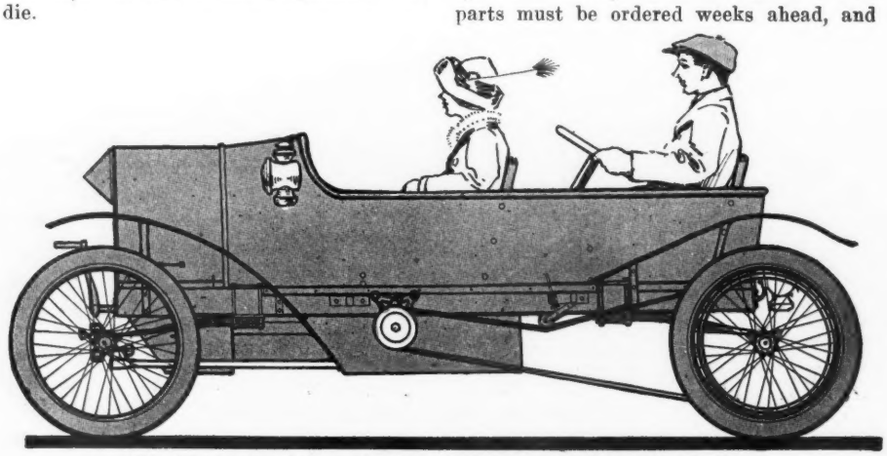
Also the sales department is doing business. Agents are coming in and seeking territory, and buyers want cars. The sales head takes care of these to get the most out of territory, allotting the sales territory in such a way that these men may not interfere in territory or in factory development, nor control too great a block of sales. The control must stay in the main factory, or the proposition will die.

These branches are being developed while the car is being built. The factory organization also is growing. Workmen on the original car are graduated to be foremen of departments; a production engineer is put in charge, and he, going over the car, suggests many changes to simplify handling parts in the machines and jigs, and to make manufacture easier at no expense or detriment to the product. This man plans the factory layout, the way of producing the number of cars per year that the sales organization wants, in the least expensive way consistent with quality.

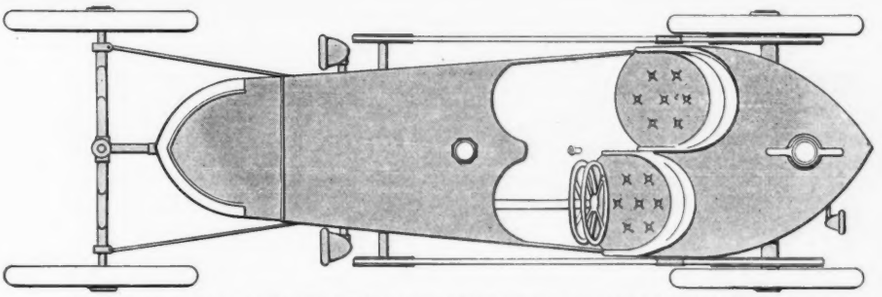
Getting Quantity Production

The parts are on the floor handy to the workman with as little rehandling through stock as possible. Down certain lanes come a certain number of parts a day to the central aisle, perhaps, and, as the cyclecar is assembled, it moves along toward the exit, the pieces on the floor being picked up and put on as the car moves out, lamps and horn going on as the car moves into the crating room of the factory.

Before all of this can be a fact the jigs, templets, dies, etc., must be made and the forgings gotten through to replace the steel and bronze castings on the first car The jigs take weeks or months, depending on the car parts and the intricacy of the machine, and these, too, need development and time to grow. The devices for inspection, the limit gauges, the thousand and one shop tools necessary to accurate manufacture have to be brought in, put in order in the right place, and workmen trained to the new jobs. Foundries have to be educated to produce the new castings to the accuracy demanded, the brass work must be gotten to specification, the forgings must be had accurate and to specific delivery dates. Malleable iron parts must be ordered weeks ahead, and



DE CROSS CY CAR SHOWING METHOD OF TIGHTENING BELT



GENERAL PLAN AND SEATING ARRANGEMENT OF FALCON CYCLECAR

so go the numberless details of the beginning of a factory organization. These take time.

Following this and the actual establishment of the factory the sales organization may develop weaknesses and need bracing up with new blood, the shop foreman may prove inefficient, the factory manager weak or of the wrong type. These will need change and another series of men be tried out, just as one would try out a new bearing type on a motor if an old one proved unequal to its task. The whole proposition is one of continual development of one thing and another—a development that will never end.

New Factory Takes Time

It is for this reason that an established factory can produce more quickly than a new firm, and get a product which is better built in a shorter time, for the new firm has to take a year or two to grow while the old plant has a manufacturing organization already. On the start this seems an advantage but all depends on the firm. Merely because a factory is available for manufacturing means nothing when it comes to quantity work, and the fact of the work starting in an established plant may work harm unless new blood is worked into the organization which will get out of the rut of former manufacturing methods on other things and fit the factory to the new product. The new factory will take longer to start, but once running and organized properly it will have an advantage over the older firm that its whole idea is to produce this cyclecar, and that the lay-out of the plant was never designed for anything else.

It is impossible for a firm to start out new and manufacture 10,000 or 20,000 cars at once, as some have announced that they will do. This cannot be done without wrecking the firm, for so many mistakes go through on first cars that the returns would eat up all profit and more, and replacements and kicks injure the reputation of the car. Production must proceed slowly, only increasing as fast as the organization grows, and it will take wiser heads to produce the simple cyclecar and make money at it than in the big car field where the margin of profit per car is so much higher, just as it takes more of an engineer to design a simple machine than a complicated one.

Sales cannot grow, nor production, any faster than the organization develops. How fast this proceeds depends on the head of the firm and his ability in picking men. On this account a good start and much publicity alone will not keep any firm in the lead. A broad foresight, a vision always of the future, and a choice of the best men for the work, so that everything may be done most efficiently is the basis of cyclecar manufacturing success. The cyclecar must be right, but this is of no assistance if the business organization be inefficient.

In all of this, advertising has not been mentioned. Harm is often done by starting publicity too far ahead of production, but once decided and having a car and an organization it were well to let the public know of the product at as early a period as possible, when publicity is so easily obtainable. The entering of contests will have to be a part of the plan of each firm that expects to establish itself firmly with the public in the next few years. To build a name for the car is important. The names established in the early days of the motor car have more weight with us than those of newly established firms, though the new cars may be as good or better. One cannot forget the public and its attitude toward the new things, and names will be made in the cyclecar field within the next year, which will be hard to supersede.

Makers Should Not Be Rushed

With all this in mind let not the layman find fault that he has to wait so long for sight of a cyclecar, or for delivery of his own machine, for there are dozens of manufacturers and a hundred experimenters today working night and day to get through the stages of organization development which have just been outlined. The excellence of your car when you get it will depend on how thoroughly this work is done, so do not rush things. Once started cyclecars will be turned out by the hundred a day and later by thousands in the same period, but this cannot be done in a hurry.

Meanwhile read all you can of cyclecars. Learn what is correct and what is erroneous. Fit your ideas to the new car instead of trying to think of it as a motor car or four-wheeled motorcycle—for it is neither. The new car demands new engineering and study will show you what you want and why. Only thorough and painstaking examination of purposed ideas will develop the best.

America now is passing through the same stages that England and the rest of Europe underwent 2 or 3 years ago when the now stalwart cyclecar industry was in its infancy on the other side of the Atlantic.

FEATURES OF FALCON CYCLECAR

There are a number of unusual features shown in the Falcon cyclecar, of Cleveland, described in this department recently. One is in the general plan and seating arrangement, this following English practice as a side-by-side seater, with the seats arranged to give the maximum elbow-room with the minimum of car width. This seats the two passengers very comfortably side by side and yet demands no more than the usual 36-inch tread.

The driver's seat is a little in front of the passenger's seat so that the elbows of the driver are in front of the passenger and there is no shoulder interference, making a very comfortable and sociable arrangement with plenty of seating room in a narrow width.

The front axle of this car pivots at the center without steering knuckles and the steering is by steel cable as in foreign practice. The belt pulleys are extra large. They are set deeper into the pulleys than shown to keep the belt from jumping on corners when the differential action takes place.

The friction change speed is operated by the wheel seen within the steering wheel, doing away with an extra lever. The whole body is stream line in form and integral lamps are fitted as shown. Thus the plan view brings out features not entirely understood from the side view shown in a recent issue.

WOODS OPENS SALESROOM

The Woods Mobilette Sales Co. has opened a salesroom on Michigan avenue, Chicago, the first cyclecar organization to invade motor row. The Mobilette has been running on the streets of Chicago for nearly a year and is in appearance as shown in the photographic reproduction.

This is a tandem seating cyclecar, the original car being fitted with a V-type air-cooled motorcycle motor. This drives by chain to a friction disk countershaft running fore and aft of the car on one side. Against this presses the friction wheel on a shaft drive to the rear axle, where a bevel and differential is fitted.

The seats fit over the main frame, between the side members of which the shaft runs to the rear, as shown, the feet of the riders being on either side of this frame, thus giving a comfortable position with the feet low, and the feet of the rear rider under the front seat, this saving space and weight.

The tread of the car is 30 inches, the aim being to get the car as narrow as possible, so that it can go through an ordinary door. A Renault type of hood is fitted.

In the new machines a four-cylinder air-cooled motor has been adopted, and a

WOODS MOBILETTE, A CHICAGO CREATION

change in the friction arrangement not yet definitely announced is being made. A raybestos-faced wheel is to be used with a specially faced disk.

The car is hung on coil spring, as shown, with radius rods to take the road and power thrust. A lever type of starter is to be fitted.

DE CROSS CY CAR

Flooded with inquiries, and unable to answer a fraction of them, the De Cross Cy Car Co., of Cincinnati, O., has issued a circular with a tentative preliminary description of its new cyclecar and a line drawing, to save offending those whose interest is intense and who are clamoring for details. The card announces that no agency propositions nor deliveries will be handled until October 1.

The car, as shown, is fitted with a two-cylinder V-type motor of 10 to 12 horsepower, friction transmission and 1¾-inch flat-belt drive to the rear wheels, with jockey pulleys to hold the belts tight. The wheelbase is 98 inches and the usual 36-inch cyclecar tread is employed. The road clearance is 10 inches.

The car is of the tandem-seating type with quarter-elliptic springs fastened to either end of an ash frame as in several of the best English cyclecars. The tank is located over the motor, as on the Bedelia and G. N. cyclecars. The drive is from the rear seat.

Answers to Cyclecar Inquiries from Enthusiasts

MOLINE, ILL.—Editor Motor Age—In the issue of Aug. 28 A. E. Rylander commented on my communication of July 17 relating to cyclecar construction. After studying the actual work of cars on the road I am fully convinced that, especially with V pulleys, a differential can be dispensed with; that a friction transmission is as good and as cheap as any; that tandem is better than side by side seating; that a V shaped imitation radiator and cowl dash gasoline tank are to be preferred; that 36-inch tread and a 90- to 100-inch wheelbase ought to be declared standard.

A point of importance that has thus far been little discussed in cyclecar construction is the size of the tires. I take it they ought to be from 28 x 2¾ to 30 x 3 inches. Smaller sizes would perhaps carry the light weight well, but most likely it is that, in the long run, they would not prove as economical as the larger sizes. Motor car owners have long since come to the conclusion that big tires more than pay for the extra outlay required, since they give much longer service. This lesson has been learned at great cost, and it is to be hoped that cyclecar manufacturers will not repeat the mistakes of earlier motor car makers. The latter had the best of excuses; they had no data to go by, but had to learn from experience.

What type of tire should be adopted? Shall the old clincher type on a one-piece rim prevail, or shall we get the quick detachable or demountable type? Personally, because of the satisfactory service they have given in comparison with other makes I am in favor of the straight side or mechanical tire on quick demountable rims. And at any rate I would deprecate most strongly the use of the old style clincher on one-piece rims. No one ought to be willing to go back to the useless labor involved in putting off or on a tire of this kind. True, with various appropriate tools the work is greatly lightened, but is yet very far from having the advantages of the quick detachable or demountable tires.

Perhaps it may be objected that the higher original cost of the latter militates against their adoption for cyclecars. I believe, however, that when manufactured in great quantities, as they are bound to be as soon as the cyclecar comes into its own, the difference will be slight.

It might be said further that cyclecars will have wire wheels, and that the quick detachable or demountable feature offers no advantages for various mechanical reasons. As a matter of fact, however, wire wheels equipped with this feature are now made and sold and give satisfaction. Besides, the slight extra weight involved in bigger tires will scarcely be a factor in the total weight of the car, since it is generally admitted that the engine develops enough reserve power to provide for this.

In short, let cyclecar manufacturers profit by the experience of motor car makers in this matter of tires. They have no need of going through the same long costly experimental stage; the pioneering has been done for them. Let them equip their product from the outset with tires of generous size arranged for the quickest possible removal and replacement.—Cyclecar.

The use of 3-inch tires on cyclecars is certainly to be recommended from the standpoint of wear, but at the present time no firm that we know of is making a demountable rim for motorcycle tire sizes, and it would be impractical for any manufacturer at present to try to make his own. When the supply firms see the possibilities of the cyclecar they will meet orders, but when clincher rims must be used a 2½ or 2¾ tire is much easier to handle than a 3-inch, when it comes to repairs on the road. A demountable wheel is easily fixed if wanted.

PULLEY RIMS AND BELTS FOR CAR

Standard Welding Co. Makes Only Those of Standard Size

Manchester, Okla.—Editor Motor Age—I have been reading the Cyclecar Department for some time and have been building a small car. It has 36-inch tread, a 96-inch wheelbase, springs underslung. I have it about completed and have reached the point where I need some information. I would like to know where I can get a 17 or 18-inch V-belt pulley rims—1⅛-inch belt—also 6-inch V-belt pulleys. These pulley rims are to be used for a 26-inch wheel. I already have my wheels and they are fitted to the car, or I would get 28-inch pulley rims and cut them down so they would fit. I have written to the Standard Welding Co., Chicago, and they are unable to supply me with what I want. I would like to know where I can get the 1⅛-inch rubber belting any length.—T. E. Buckles.

The Standard Welding Co. is the only firm Motor Age knows of making suitable rims.

It would be possible to cut down a 28-inch rim but the joint would need to face the right way or it would cut the brakes, and care would be necessary to get the rim round. It is doubtful if an amateur could do this, but with the experience your letterhead would indicate, your shop should be able to handle the job.

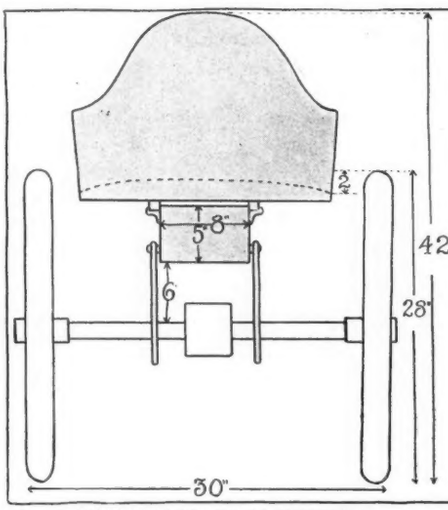
The description of your car sounds very good. Motor Age would be glad to receive photographs of it. Rubber belting is made by the Pennsylvania Rubber Co., Jeanette, Pa., or can be imported from England.

The Merkle Motorcycle Co. can furnish you with the 6-inch front pulleys.

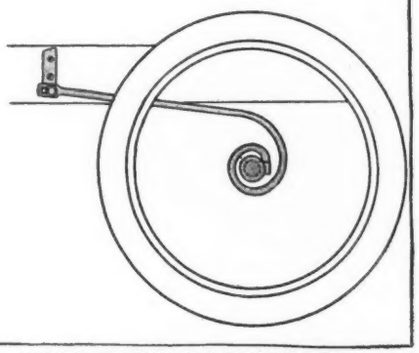
Makes Truck Motor

Cincinnati, O.—Editor Motor Age—Kindly tell me where I can buy a motor similar to the one used in the Imp cyclecar. I like the friction drive idea, and am thinking of building a cyclecar along similar lines.—D. C. Stafford.

The motor you desire may be obtained with friction disk and thrust in unit from the Universal Machinery Co., Milwaukee, Wis., makers of the Mack cyclecar motor. The Mack is the one used by the car you mention.



DIMENSIONS OF MOBILETTE



NOVEL SPRING ON MOBILETTE

The Motor Car Repair Shop

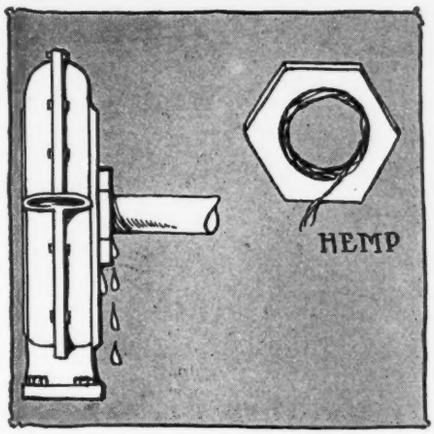


FIG. 1—COMMON WATER CONNECTION LEAK

Due usually to the pump nut requiring new packing

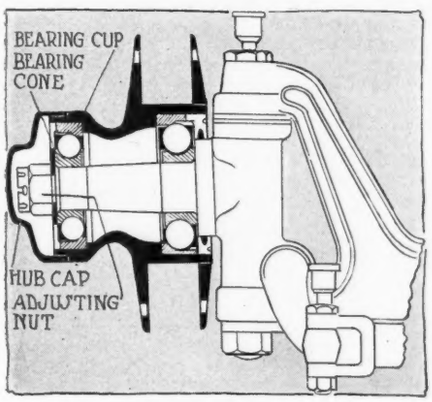


FIG. 2—ADJUSTING CUP AND CONE BEARING

Care should be taken not to adjust too closely and thus cause binding

LEAKS in the water pump or its connections give almost as much trouble as sooty spark plugs and punctured tires, but with a little forethought the commonest of these leaks may be stopped even when on the road. Before any touring is begun a few feet of hemp should be placed in the tool box for the purpose of plugging water leaks. In Fig. 1 is shown a common construction in which a nut is used on the pump shaft. The leak usually is caused by the packing in the nut not doing its work properly. Very good material for such packing is ordinary hemp or rope threads which may be purchased in any supply store or garage. This substance when stuffed into the nut will hinder the flow of water.

Cleaning Oxygen for Carbon Removing

The new method of removing carbon from the cylinders of a motor car by the use of oxygen has come into great use lately and a reader has asked why it would not be better to clean the oxygen from the tank and thus perhaps get better results. It seems plausible that better results would be obtained if the gas were cleaned before it reach d the cylinders, for there is a probability that the oxygen contains injurious gases. Potassium permanganate is very good for this work. This chemical may be bought in crystal form and then a solution made with water. A saturated solution should be used. The hose leading from the oxygen tank is led into a large bottle containing the solution, as shown in Fig. 4. As will be noted, there is another tube leading from the bottle. The gas in its path passes through the potassium permanganate and the impurities thus removed. The clean gas passes through the other tube to the cylinders. These tubes may be made of either rubber, or glass with rubber attachments.

Repairing Water Pump

Adjusting Cup and Cone Bearings

In determining whether or not cup and cone bearings need adjustment it is suggested that the wheel which operates on the bearing be jacked up and then by shaking the wheel in all directions any play present may be felt. Should there be play the following method is usually employed in adjusting the bearing: In Fig. 2 is shown a diagram of a spindle with a New Departure ball bearing and the method of adjusting is as follows: Remove the hub cap of the wheel. This done, there is exposed the adjusting nut of the bearing. This nut, shown in the illustration, when turned to the right will take up the play present. Care should be taken not to turn it up too far. One turn at a time should be given and each time the wheel should be shaken to note if the play has disappeared. If it has, the wheel should be given a push and if it keeps turning for a few revolutions the adjustment is correct. If it turns with an effort the bearing is too tight.

Look Before You Leap

Amateur repair men will often start hammering a piece of metal without even as much as finding out whether the pounding will do any good. More often the metal is given one blow and it breaks. It breaks because it is hardened. Before one attempts to do any hammering an examination should be made of the part to see whether it will withstand the shock. The usual method of determining whether the metal is hard or soft is to run a file over it. If any impression is made easily the metal is soft, but if the file scratches with difficulty the metal is hard and should not be struck with a hammer head. In striking hardened metal place a piece of wood over the spot to be hit and then strike the wood with the hammer.

Marmon Spring Test

At the Marmon factory in Indianapolis each spring is given a thorough test as to its ability to withstand severe strains. The apparatus employed is illustrated in Fig. 3 and consists of a scale upon which is a steel block with two tracks. Two small trucks operate on the tracks. These trucks support the spring at either end, as shown. The press operated by a wheel is forced against the spring and the weight thus recorded by the scale. As the spring elongates the little trucks move on their respective tracks. The amount of spring deflection is noted and at the same time the weight upon the spring necessary to produce that deflection is read on the scale.

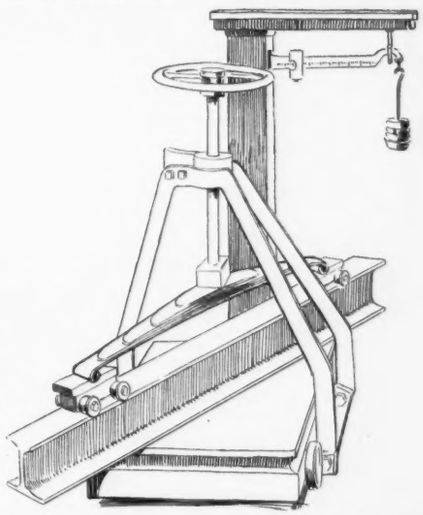


FIG. 3—METHOD OF TESTING MARMON SPRING

The scale reading and amount of spring deflection are both taken

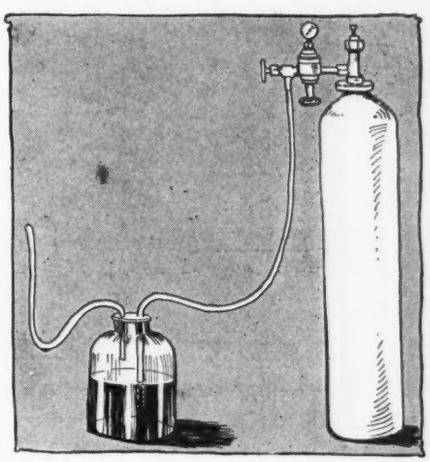


FIG. 4—CLEANING OXYGEN FOR CARBON REMOVING

Potassium permanganate used for removing impurities from the gas

From the Four Winds

ITALIAN Race Driver Is Killed—While driving in a pursuit race against Gaston Morris, Louis Meneghetti, known as "Mad Louis" and claimant of the South American championship, was killed at Norfolk, Neb., last week when the Fiat that he was driving turned turtle.

Kansas City's New Law—An anti-joy ride ordinance has been adopted by the city council of Kansas City, Mo., which prohibits girls under 18 years of age and boys under 21 years old from riding in motor cars, unless chaperoned by an elder person, between the hours of 9 o'clock at night and 6 o'clock in the morning. The exempting clause states that they must be either brother or accompanied by their parents or by an adult of reputable character. The driver of a motor car obtained by hire cannot occupy this position.

Minnesota Residents Good Prospects—More than 1,660 motor cars have been sold in Minnesota in 1913, according to the registration in the secretary of state office. This is an increase of 66⅔ per cent, placing Minnesota among the ten leading states. Of the 40,400 cars registered, one-third are in the twin cities. About 8,000 are said to be owned in Minneapolis and about 4,000 in St. Paul. The personal tax returns for Minnesota reveal 28,197 cars, compared with 21,331 last year. The valuation at an average assessment shows on the rolls at $7,841,019, an increase from $6,702,539 in 1912.

Truck to Transport Football Squad—Traveling in a Moreland truck, the football squad of the San Diego Army and Navy Academy will invade Arizona early in November to play the Phoenix Indian school team. The truck has been donated for the trip by Watt Moreland, of Los Angeles, the manufacturer. The trip through the Imperial valley and over the Arizona deserts will consume 3 days, not counting a day the boys will lay over at Yuma to rest up and practice. A special body will be built on the truck, which will carry twenty-two persons.

Good Roads Cause Loses Advocate—Dr. Thomas Nelson Page's appointment as ambassador to Italy will interrupt his energetic work in behalf of good roads. Dr. Page has for several years been chairman of the membership committee of the American Highway Association, and has brought into that organization nearly 2,000 of America's foremost citizens. Filling the vacancy caused by Dr. Page's absence will be one of the tasks before the association at its coming meeting during the American Road Congress, which is to be held at Detroit throughout the week of September 29.

Transport Laborers by Motor Trucks—If a manufacturing concern leaves one town and goes to another because of labor troubles and help is needed at the new location, the motor truck becomes a useful accessory. This is well set forth in the case of the Aeolian company, of Meriden, Conn., maker of piano players and music rolls. Some time ago a general strike took place at the Meriden factory. The Hartford interests induced the concern to move to the capital city. Then arose the question of getting the men to Hartford from Meriden, but that was simple. Arrangements were made with a Hartford dealer to supply motor cars to bring the men to Hartford and take them back to Meriden at the end of the day. This arrangement was carried out for a time. Now sight-seeing buses convey the music workers from their homes in Meriden to their work in Hartford.

Wants Chauffeurs on Water Wagon—Senator W. F. Potting, of Akron, O., has started a movement to secure the passage of a state law governing the conduct of chauffeurs. He is in favor of revoking the license of chauffeurs who become intoxicated in addition to fining and imprisoning the offender. He is also in favor of making it an offense for a chauffeur to enter a saloon while in charge of a motor car.

Race Course in Bad Shape—Several motorists who have recently driven over the route of the Los Angeles-Phoenix road race state that it is in bad shape most of the way from Los Angeles to Phoenix as a result of late summer rains. The roads are cut badly and there are deep ruts and chuck holes. One motorist was stuck in the mud for 22 hours 80 miles west of Phoenix. County authorities all along the route promise extended improvements before the time of the race.

Penny Motorbuses for Montreal—The Canadian Autobus Co. is studying the feasibility of penny fares in Montreal, and it is not beyond expectations that this charge will be made after the service has had a good start. The first shipment of motorbuses for the new Canadian service is expected to be dispatched from England during the next few weeks. The Canadian Autobus Co. is in close touch with the London General Autobus Co., two of the directors of the latter having seats on the English board of the Canadian company and an engineer from England is likely to come to Montreal to help with the starting of the new service. Already nearly 150 buses are ready for delivery.

Indiana Orders 50,000 License Tags—A contract for furnishing state license tags for 1914 has been let by the Indiana secretary of state. The contract calls for 50,000 number plates for motor vehicles at 32 cents a pair and for 10,000 motorcycle number plates at 10 cents each.

Motor Car Pulls Train—The Frisco railroad has equipped two passenger trains on its Clinton-Vernon branch with motor cars. The car pulls a baggage and mail car and has accommodations for fifty passengers. The Frisco has experimented with the motor car service on several of its branch lines. The Lawton-Quanah branch was the first so equipped in Oklahoma.

Gives Motor Car to Jockey—After Jockey Small had piloted five winning mounts across the line in one day at Windsor, Ont., Owner McKenzie, of the stable for which Small rides, told him to cross the river to Detroit, buy the motor car that looked best to him, and have it charged to the McKenzie account. Small is now touring overland to his home at San Antonio, Tex., in a Studebaker.

Highway Experts Form Partnership—Arthur H. Blanchard, M. Am. Soc. C. E., consulting highway engineer and professor in charge of the graduate course in highway engineering at Columbia University, and Prevost Hubbard, Assoc. Am. Soc. C. E., consulting chemist, in charge of the division of roads and pavements, the Institute of Industrial Research of Washington, and lecturer in highway engineering chemistry in Columbia University, have formed a partnership under the firm name of Blanchard

Recent Incorporations

Augusta, Me.—Jeffery-Dewitt Co., capital stock, $5,000,000; to manufacture, sell and deal in motor cars and parts; incorporator, E. M. Leavitt.

Beloit, Wis.—Heon Electric Reminder Co., capital stock, $10,000; to manufacture electrical clock device; Charles Heon, president.

Camden, N. J.—Automobile Development Co., capital stock, $10,000; incorporators, George Martin, S. C. Seymour, J. F. Cotter.

Camden, N. J.—American Motor Transit, Inc.; to deal in motor cars; incorporators, L. J. Bergdoll, F. R. Hansell, F. S. Garman.

Chicago—Simplex Wire Wheel Co., capital stock, $30,000; to deal in wire wheels; incorporators, J. J. Cusick, A. G. Loveless, J. R. Cochran.

Chicago—Times Square Automobile Co.; to manufacture and deal in motor cars and accessories.

Chicago—Sixty-first Street Garage Co., capital stock, $1,500; to deal in motor cars; incorporators, A. C. Bender, W. A. Belle, C. L. Sentz.

Cincinnati, O.—Cincinnati Velie Motor Sales Co., capital stock, $5,000; incorporators, J. F. Fauth and others.

Cincinnati, O.—Jenkins Graphite & Lubricating Co., capital stock, $100,000; to manufacture and deal in lubricants; incorporators, S. M. Jenkins, E. G. Reitman, W. Reinhart, L. Nolan, W. J. McCauley.

Crawfordsville, Ind.—American Motor Wheel Co., capital stock, $600,000; to manufacture trucks; incorporators, W. H. Owen, S. C. Rowland, J. V. Wilson.

Detroit, Mich.—Oleson-Adams Co., capital stock, $10,000; to manufacture parts; incorporators, J. A. Oleson, W. R. Adams.

Eau Claire, Wis.—Darwin Motor Car Co., capital stock, $10,000; to deal in motor cars; incorporators, O. C. Darwin, W. C. Tufts, G. Anderson, M. D. Garrison.

Edwardsville, Ill.—Edwardsville Garage & Automobile Supply Co., capital stock, $10,000; to conduct garage; incorporators, T. J. Fahenstock, O. H. Giess, W. P. Kriege.

Elm Grove, W. Va.—Elm Grove Motor Sales Co., capital stock, $5,000; to conduct garage; incorporators, G. W. Hand, D. L. Walter, J. E. Shorts, H. V. Springer, Dr. R. M. Peddicord.

Hempstead, N. Y.—G. B. Garage & Mfg. Co., capital stock, $50,000; incorporators, S. C. Sammis, L. B. Haff, R. L. Vandewater.

Hempstead, N. Y.—London Limousine Co., capital stock, $10,000; to manufacture bodies; incorporators, J. A. McAvoy, C. U. Stowe, A. M. Stowe.

Herkimer, N. Y.—Garage Co., capital stock, $5,000; incorporators, C. O. Terwilliger, J. B. Terwilliger, N. F. Hand.

Indianapolis, Ind.—C. A. Chambers Co., capital stock, $5,000; to deal in supplies; incorporators, C. A. Chambers, L. M. Chambers, A. L. Catterlin.

New York—Bellamore Toomey Co., capital stock, $30,000; to manufacture and deal in motor cars; incorporators, D. G. Bellamore, D. R. Bellamore, T. H. Toomey.

New York—Velvet Co.; to equip cars with shock absorbers; incorporators, H. O. Proctor, A. H. Miller, W. D. Ramsburgh.

New York—Harroun Carbureter Co., capital stock, $25,000; to manufacture parts; incorporators, V. Kliesrath, W. F. Blaisdell, R. B. Hults.

New York—Automobile Manual Publishing Corp., capital stock, $1,000; incorporators, D. M. Steindler, H. Goldsmith, G. Holland.

New York—Sharrer Patent Top Co., capital stock, $25,000; to manufacture motor car tops; incorporators, E. B. Hart, J. M. Sharrer, P. McCoy.

New York—Lent Motor Fire Engine Corp., capital stock, $250,000; to sell fire engines; incorporators, W. R. Fuller, O. J. Heig, I. V. Weisbrod.

Oklahoma City, Okla.—Hupmobile Sales Co., capital stock, $5,000; incorporators, W. H. Say, L. S. Liggett, H. Poole.

Oklahoma City, Okla.—Rex Oil Refining Co., capital stock, $50,000; incorporators, L. M. Pierucis, M. Lutz, M. Boyce.

Rutherford, N. J.—Baldwin Auto Garage, capital stock, $100,000; general motor car business; incorporators, D. N. Knoller, M. Cohen, A. Ely.

Statesville, N. C.—Carolina Motor Co., capital stock, $25,000; incorporators, H. H. Yount, S. B. Miller, J. M. Deaton, G. L. McKnight.

Staunton, Va.—Staunton Automobile Livery & Transfer Co., capital stock, $25,000; incorporators, N. C. Williams, Jr., T. M. Hoopes.

Tucson, Ariz.—Richardson Auto Co., capital stock, $20,000; incorporators, J. B. Richardson, H. Gauthen, C W. McCullough, C. T. McCullough.

& Hubbard, highway efficiency experts, with offices at Broadway and One Hundred and Seventeenth street, New York. At present Messrs. Blanchard and Hubbard are retained by Commissioner John H. Delaney as the advisory highway board for the New York State department of efficiency and economy.

Stutz and Ford Are Winners—Jim Parsons, driving the Stutz in which he won the Intercity road race at Tacoma in July, won two events, the 1-mile free-for-all against time and the Australian pursuit race, at the speed carnival held in connection with the King county fair at Seattle, September 14. Frank Bennett, in a Ford, won the other race on the card, a 15-mile event. Over 10,000 spectators witnessed the races.

Six-Cylinder Funeral Supplied—What is said to be the first fleet of six-cylinder motor cars used for funeral purposes in the United States was put in motion last week by the Wacker-Helderle Undertaking and Livery Co., of St. Louis. The concern abandoned all its horses and equine equipment at an auction sale and started at once to remodel its stables into a modern garage. Local dealers say that nearly all vehicles used by embalmers heretofore have been of the four-cylinder size.

Arouses the South — Splendid weather helped in making the trip of the all-southern transcontinental highway pathfinder a splendid success through Louisiana. E. L. Ferguson, the official pathfinder, delivered good roads lectures at each city, town and cross-roads. The idea of an all-southern highway met with universal approval. Mr. Ferguson's plea for frequent short motor tours between neighboring towns opened the way for many plans in Louisiana, where the tour idea is not generally used as a method of getting the people together.

Good Roads Brevities

THE levy court of New Castle county, Delaware, is gradually acquiring the turnpikes for public use. It has just agreed to take over the Wilmington and Philadelphia pike for $8,000, which will leave only two toll roads out of Wilmington.

With the placing of convicts on the roads in some counties of Alabama, the state has ordered a 5-ton truck to be used on trial in state road building. If the performance of this truck is satisfactory, it is probable that one or more will be added to each convict camp.

Graham county, in which Safford, Ariz., is located, has had its first good roads day and as a result that section of Arizona boasts one of the best stretches on the proposed ocean-to-ocean highway. About fifty business and professional men deserted their offices for a day and with shovel, scraper and pick placed the road from Solomonville east to the Greenlee county line in perfect condition. Other good roads days are being planned.

Missouri as a state will pay $15 a mile for the grading and maintenance of 11,781 miles of country road connecting each county seat in the state. A road law, outlining a system which will connect the county seats of each of the 114 counties of the state, was enacted by the last legislature and provided that the state should pay $15 a mile for the dragging and maintenance of each mile of these roads. The aid is applied to counties which work their roads into such condition that they are acceptable to the state board of good roads. Already approximately one-third of the counties have applied for their share of the funds and the other counties are taking advantage of the new law rapidly. About 350 big concrete culverts have been built as a result of it and many thousands of miles of roads improved and widened. The hedges have been cut and culverts and bridges put into shape.

Oscar Underwood is to be the principal speaker at the meeting of the Alabama Good Roads Association, which is to be held at Mobile, November 20 to 22.

James R. Marker, state highway commissioner of Ohio, announces that the maximum grade of the Old National highway which will be improved from the eastern border of Ohio to Columbus during the coming year will be about 7 per cent. No effort will be made to straighten the road because of the delay it would occasion.

A call has been issued for a meeting October 24 and 25 in Minneapolis of the members of the Yellowstone Trail Association. This trail runs from the twin cities through Aberdeen, S. D. The association was organized 2 years ago at Ipswich, S. D., and the trail has been blazed to the Missouri river, where a bridge is needed opposite Mobridge.

More interest seems to be manifested by the smaller towns in Connecticut in road betterment this season than ever before. A number have turned the roads over to the state for care and repair. Many contracts have been let during the past week. Before cold weather there will be little unimproved road along the main lines. Salstonstall hill in Brandford is being cut down 25 feet, repairs on the Meriden-New Haven road below Wallingford are nearly completed, the Avon mountain trail is about ready to be opened to travel and the long needed concrete bridge on the Hartford Bloomfield road is finished. Another important stretch that is being put in good order is that from Bolton Notch to Andover, on the Hartford-Providence road. Repairs on the New Haven turnpike are progressing. Several of the larger towns have voted substantial sums for improvement.

A. L. Westgard, official map-maker for the American Automobile Association, paid Denver a visit recently in relation to a route-marking trip through Colorado's mountains. A luncheon was given in his honor at the Savoy hotel by the Denver Motor Club and other organizations working for highway improvement. Governor Ammons and State Highway Commissioner Ehrhart were among the speakers.

What the passing generation failed to do for roads in Mississippi is being done by its offspring. It is the young Mississippians, according to Governor Earl Brewer, who are influencing the expenditure of millions on roads in the state. There has been much complaint that the school and other funds were robbed to benefit the wealthy, the owners of motor cars, but Governor Brewer says such an allegation is unfounded. The expenditure is heavy, but the present generation is carrying its own burden and that of their fathers as well, he says.

Impetus was given the Kentucky good roads movement recently at the annual meeting of the Kentucky Good Roads Association held at the state fair grounds. The organization decided not only to ask Governor James B. McCreary to set aside two days during the last week in October for road work throughout the state, as recently was done in Missouri, but went on record favoring the use of convict labor on the highways of the state. Colonel R. J. McBryde, of Louisville, was elected president of the organization to succeed H. A. Sommers.

Coming Motor Events

September 27—Track meet, White Plains, N. Y.
*September 27-28—Track meet, Bakersfield, Cal.
October 3—Track meet, Trenton, N. J.
October 3-4—Track meet, Oklahoma City, Okla.
October 4—Track meet, Fresno, Cal.
October 4—Track meet, Providence, R. I.
November 2-3—Los Angeles-Phoenix road race.
November 4-5—Road race, El Paso, Tex., to Phoenix.
November 6—Track meet, Phoenix, Ariz.
*November 24—Vanderbilt road race, Savannah, Ga.
†November 27—Savannah grand prix.

*Sanctioned by A. A. A.
†Sanctioned by A. C. A.

SHOWS, CONVENTIONS, ETC.

September 29-October 4—American road congress, Detroit, Mich.
October 6-18—St. Louis show.
October 15-25—Electric show, Grand Central palace, New York city.
October 17-27—Paris show.
October 18-November 2—Dallas show.
October 21-24—Trans-Mississippi Commercial Congress, Wichita, Kan.
October 22-27—Omaha show.
October 27-28—Convention Electric Vehicle Association of America, Chicago.
November 7-15—Olympia show.
December 9-12—Annual convention of American Road Builders' Association, Philadelphia.
December 11-20—First International Exposition of Safety and Sanitation, New York city, American Museum of Safety.
January 2-10—Importers' Automobile Salon, Hotel Astor, New York.
January 3-10—New York show, Grand Central palace.
January 24-31—Chicago show.
January 26-31—Scranton, Pa.
January 31-February 7—Minneapolis show.
February 2-7—Buffalo passenger car show.
February 9-14—Buffalo truck show.
February 21-28—Newark, N. J.
February 22—March 5—Cincinnati, O.
March 7-14—Boston passenger car show.
March 9-14—Des Moines, Ia.
March 17-21—Boston truck show.

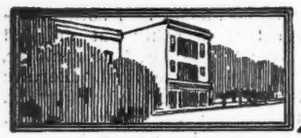
Recent Club Activities

AT a meeting of the Bluegrass Automobile Club, with headquarters in Lexington, Ky., the following officers were elected for the ensuing year: H. H. Roberts, president; W. C. G. Hobbs, vice-president, and E. L. March, secretary and treasurer. A committee was appointed to secure permanent quarters for the organization.

The first annual meeting of the Indiana Automobile Association will be held in Indianapolis, probably in October. Details of the coming convention are now being worked out. The association is a federation of the principal motor clubs of the state and was originated by W. S. Gilbreath, secretary of the Hoosier Motor Club, Indianapolis.

At a meeting of representatives of the Canadian motor clubs and associations held recently at the headquarters of the Ontario Motor League, the Dominion Automobile Federation was formed. All clubs, leagues, and associations in the dominion are to be eligible for membership. The officers elected were: Provisional president, Oliver Hazleton; vice-presidents, G. H. Cottrell, of Vancouver, and Frank Carroll. G. Robertson was appointed provisional secretary and treasurer of the newly formed Canadian association.

The Waukesha Motor Club, of Waukesha, Wis., which recently gained fame by emulating the example set by Missouri good roads enthusiasts, is planning to provide its members with clubhouse facilities before the next season. Waukesha is 17 miles from Milwaukee and about the same distance from the heart of the Waukesha county lake region, famous the world over. The club contemplates the purchase of acreage at the east end of Pewaukee lake, 12 miles from Waukesha, the construction of a bungalow type of clubhouse, and laying out a 9-hole golf course.



Among the Makers and Dealers

NEW Traffic Engineer for Packard—Rollin W. Hutchinson, Jr., M. E., has been appointed traffic engineer of the truck division of the Packard Motor Car Co.

Top Makers to Enlarge Plant—The Canadian Top Co., of Tilbury, Ont., will build a two-story addition to its plant this fall with a view to increasing its capacity for manufacturing motor car tops.

Alma Opens Export Offices—The Alma Motor Truck Co., manufacturer of the Republic truck, has opened export offices at 17 Battery place, New York. R. V. Warman will have charge of foreign business.

Located at Minneapolis—The Continental Engineer Co., manufacturing gasoline motors, large roadsters and cyclecars, has completed the work of locating its factories and offices at Minneapolis, Minn., and will begin full operation October 1.

To Make New Trailer—Motor car trailers, invented by the Sherwood brothers, will be manufactured on an extensive scale during the coming winter at the plant of the Tuttle Motor Co., in Canastota, N. Y. The work will be under way in several weeks and will give employment to 150 men.

Install 186,000-Pound Press—The Thomas B. Jeffery Co., Kenosha, Wis., manufacturing Rambler and Jeffery motor vehicles, has installed a giant double toggle drawing press weighing 186,000 pounds for the production of fenders, hoods and cowls. The press is one of four of this size in use in the United States and is the largest in the northwest. It required six freight cars for its transportation to Kenosha.

May Move from Racine—It is reported that the Hamilton-Beach Mfg. Co., Racine, Wis., producing electrical appliances and devices, will leave Racine and locate elsewhere. The concern is capitalized at $50,000. Messrs. Hamilton and Beach sold their majority interest in the company about a year ago, and have since organized the Wisconsin Electrical Co., manufacturing a line of motor-driven specialties and accessories at Racine.

Break Ground for New Buildings—Charles H. Besley & Co., Chicago, manufacturing grinding and polishing machines in a large works at Beloit, Wis., has broken ground for several new buildings, which will triple the size of the Beloit shops. All structures will be of reinforced concrete construction. The Besley company established its Beloit works in 1886. The extensions will make available about 75,000 square feet of additional floor space.

Friend Mitchell Sales Manager—Leo A. Peil, for 8 months general director of sales of the Mitchell-Lewis Motor Co., Racine, Wis., has resumed his active connection with the Mitchell Automobile Co., Chicago, Racine and Milwaukee, which handles a vast territory in the middle west as distributor of Mitchell cars. Mr. Peil is succeeded by Otis C. Friend as sales manager. Mr. Friend has been advertising manager of the Mitchell-Lewis company for several years.

Plan Campaign of Expansion—F. A. Tuschen, Milwaukee, and Andrew S. Scheuerell, Sun Prairie, Wis., who recently purchased the assets of the defunct Yale Mfg. Co., at Oostburg, Wis., and is continuing the manufacture of the Yale silencer for motor cars, are planning to engage more extensively in the manufacture of motor car accessories and specialties, including steel stampings and castings. The new concern is styled the Yale Muffler Co., and the operations are in charge of Mr. Scheuerell. The new program contemplates the erection of one or two new shop buildings early in 1914.

Set Date for Annual Meeting—The fourth annual meeting of the Electric Vehicle Association of America will be held at 2:30 o'clock, October 14, at 55 Duane street, New York.

G. J. G. Car Makers May Move—Contemplating moving to a more desirable motor car factory location, the G. J. G. Motor Car Co., of White Plains, N. Y., is now considering several propositions and proposals.

New Mercer Sales Manager—Walter A. Almy has been appointed sales manager of the Mercer Automobile Co., Trenton, N. J. Prior to his connection with the Mercer company, Mr. Almy devoted several years to the retail sale of Cadillac cars in White Plains, N. Y., and Trenton, N. J.

New Factory for Body Company—Finding it necessary to enlarge its present plant, the Union City Body Co., of Union City, Ind., now is erecting a large factory addition which will greatly increase its facilities for manufacturing pleasure car bodies. At the annual meeting in August an increase of $45,000 in capital stock was voted.

Goodyear Tire Sales Gain—Sales of the Goodyear Tire and Rubber Co. in July and August showed a gain of 34 per cent over the same months in 1912. Sales for the fiscal year to date are 33 per cent ahead of last year. Last year the company paid a dividend of 12 per cent, which consisted of a single disbursement at the close of the fiscal year. Present plans call for a dividend at the end of this year at least as large as that of 1912.

Lozier to Push Canadian Sales—As a preliminary step toward the marketing of a greater portion of its output in Canada, the Lozier Motor Co. has announced the appointment of Louis Logie, of Toronto, to the position of Canadian sales manager. Mr. Logie has already established his headquarters in Toronto and will have supervision of Lozier sales throughout the various provinces. At the present time Lozier representatives are located in Winnipeg, Vancouver and Montreal.

Cyclecar Company Elects Officers—The Princess Cyclecar Co., of Detroit, Mich., at a recent meeting of the stockholders completed its organization by the election of the following officers: President and manager, I. N. White; vice-president, C. H. Leete; secretary and treasurer, H. H. Dawson; consulting staff of engineers, C. G. Thornewell, Edward H. Vincent, Harold L. Blydenburgh, John A. Martin. Engineering offices have been opened at 790 Woodward avenue and the company expects to have six demonstrators on the road for testing purposes within the next few weeks.

Lima to Have Motor Show—Practically all of the motor car agents of Lima, O., have arranged to hold a show in the public square of that city October 1 to 3 inclusive in conjunction with the first annual style show given by the Retail Merchants' Association. The style shown will be of woman's garments and will be in the various retail establishments. Mayor Shook has agreed to give up the public square for the show and dealers who will exhibit are Ohio Auto Supply Co., W. A. Williams, Carr & McLeod Sales Co., Griffith Auto Sales and Supply Co., The Thomas Motor Co., Edward Hawisher, Charles Chappell, the Lima Overland Co., the Electric Service Station Co., Crites Bros., W. E. Rudy, the Gramm Motor Truck Co., and the Gramm-Bernstein Co.

Baus Rejoins Studebaker Corp.—Richard E. Baus, a former Studebaker manufacturing expert, who has been more recently in charge of the Maxwell plant at Dayton, O., has rejoined the Studebaker staff as an assistant to Production Manager Max Wollering.

Des Moines Show Dates—The Des Moines Automobile Dealers' Association, which conducts the annual show at Des Moines, Ia., has chosen March 9 to 14 as the dates for the 1914 show, which will be the fifth annual local exhibition. It will be housed in the Coliseum.

Peerless Drops Yearly Models—The Peerless Motor Car Co. announces it has abandoned the plan of putting out yearly models, although from time to time new series will be announced. The entire scheduled production of Peerless cars up to October 1 was sold out by August 1, and the company has been forced to make arrangements to increase production.

Canadian Tire Factory Finished—The Berlin, Ont., plant of the Dominion Tire Co., Ltd., a subsidiary of the Canadian Consolidated Rubber Co., has been completed and machinery and other equipment is now being installed. Officials of the company state that the plant will be in operation within a few weeks. The factory is said to be very complete and to have cost approximately $600,000.

Establish Branch at Waukesha—The Siebers & Raisch Pattern Works, 686-690 National avenue, Milwaukee, Wis., has established a large branch works in Waukesha, Wis., to serve several of the big manufacturing concerns in the Spring City. Particular attention will be paid to the needs of the motor and aluminum castings works in Waukesha, which now take a high rank among the city's industrial institutions.

Motor Car Plant for Butler—The rumor that a motor car factory is being erected in Butler, Pa., by the Standard Steel Car Co. has been verified, although the officials refuse to make any definite statements regarding their aims when the buildings are completed. They are now in course of construction near the mills of the car company, on a site of about 10 acres formerly used as a lead mill. Work has been progressing for some time.

Start Recruiting More Members—The recent consolidation of the Automobile Board of Trade with the National Association of Automobile Manufacturers has increased the scope of the Automobile Dealers' Association, Inc., of New York, and the A. D. A. is planning to secure a number of other companies as members of its organization. At a recent meeting of the board of directors, the Stutz Motor Car Co. was elected a member of the association, to be represented by William Parkinson.

Body Building Company Reorganizes—The personnel of the new management of the Racine Mfg. Co., Racine, Wis., one of the largest body building concerns in the west, is announced as follows: President, C. A. Hamilton; vice-president, Charles F. Barndt; secretary, Harold Smith; treasurer, F. J. Kidd; directors, Faustin Prinz, W. F. McCaughey, Frank K. Bull, M. E. Walker and the officers. Mr. Hamilton is general manager and Mr. Barndt factory manager.

Brief Business Announcements

Recent Agencies Appointed by Motor Car Manufacturers

PASSENGER CARS

Town	Agent	Make
Baltimore, Md.	Poehlman Automobile Co.	Cole
Bloomington, Ind.	College Avenue Garage Co.	Cole
Boston, Mass.	Cole Motor Car Co.	Cole
Bowen, Ill.	H. L. Spangler	Cole
Carroll, Ia.	I. E. Osborne	Cole
Chicago Heights, Ill.	Conklin & Spindler	Cole
Cincinnati, O.	George C. Miller & Sons Carriage Co.	Cole
Cincinnati, O.	George Miller	Cole
Cincinnati, O.	George Miller	Standard
Columbus, O.	Franklin Cycle & Supply Co.	Cole
Columbus, O.	Gaither Auto Co.	Chandler
Columbus, O.	Warren & Southwick Car Co.	Imperial
Columbus, O.	Curtin Williams Automobile Co.	Cadillac
Columbia, Mo.	Columbia Automobile Co.	Cole
Corydon, Ind.	G. A. Bullist	Cole
Decatur, Ill.	Fireproof Garage	Cole
Decatur, Ill.	W. L. Shallsberger & Sons	Cole
Denison, Tex.	Davis Livery & Auto Co.	Cole
Des Moines, Ia.	Inter-State Auto Co.	Moon
Duquoin, Ill.	Southern Illinois Garage	Moon
Easton, Pa.	Lafayette Motor Car Co.	Cole
Elk Creek, Neb.	George Van Winkle	Ford
Eau Claire, Wis.	Darwin Motor Car Co.	Cadillac
Freehold, N. J.	Clayton & Donahay	Cole
Grand Rapids, Mich.	E. A. Merrill	Cole
Green Bay, Wis.	Washington Garage	Cole
Hoopestown, Ill.	John Ruck	Moon
Huron, S. D.	A. M. Urquhart	Cole
Jefferson City, Mo.	Capitol Equipment Co.	Cole
Joplin, Mo.	P. E. Tabor	Cole
Kansas City, Mo.	Cole Motor Co.	Cole
Lexington, Mo.	John M. Seiter	Cole
Logansport, Ind.	Auto Distributors Co.	Cole
Madison, S. D.	Abel Mitchell	Cole
Mansfield, O.	H. G. Burns	Cole
Marion, O.	C. E. Miller	Cole
Marshall, Mo.	Blosser Brothers	Cole
Meridian, Miss.	Charles K. Cohn & Co.	Cole
Mexico, Mo.	Fred A. Morris	Cole
Milton, Pa.	Coover's Garage	Cole
Milwaukee, Wis.	Curtis Automobile Co.	Cole
Minneapolis, Minn.	J. P. McGuire	American
Moorestown, N. J.	Moorestown Motor Co.	Cole
Nashville, Tenn.	Cumberland Motor Co.	Cole
Newton, Ill.	Newton Motor Car Co.	Cole
Oran, Mo.	C. & A. J. Matthews	Cole
Ord, Neb.	T. P. Newbecker	Ford
Ortonville, Minn.	J. Arthur Matthews	Cole
Oxnard, Cal.	Crescent Garage & Machine Co.	Cole
Raleigh, N. C.	J. R. Norris	Cole
Salisbury, Mo.	Stamper & Stamper	Cole
San Jose, Cal.	Dixon & Baumgartner	Cole
Santa Barbara, Cal.	H. Wood & Son	Cole
Santa Rosa, Cal.	Theodore Baisden	Cole
Sault Ste. Marie, Can.	Fulton Hardware Co.	Cole
Sioux Center, Ia.	John Winterfield	Cole
Sioux Rapids, Ia.	Sioux Rapids Auto Co.	Cole
Streator, Ill.	Central Garage	Cole
Springfield, O.	E. L. Ensign	Cole
Parsons, Kans.	O. H. Peak	Cole
Pasadena, Cal.	G. M. Davis	Cole
Perry, N. Y.	H. C. Simmons	Cole
Pilot Grove, Mo.	J. Yauchacy	Cole
Plattsmouth, Neb.	Plattsmouth Garage	Ford
Portland, Ore.	Northwest Auto Co.	Cole
Porterville, Cal.	G. J. Stillman	Cole
Portland, Ore.	Northwest Auto Co.	Cole
Sisseton, S. D.	Stavig Brothers	Cole
Somerville, Tenn.	C. A. Oliver	Cole
St. Louis, Mo.	Southern Motor Car Co.	Haynes
St. Louis, Mo.	Southern Motor Car Co.	Metz
St. Louis, Mo.	Weber Improvement Co.	Briggs-Detroiter
St. Louis, Mo.	Kissel Kar Co.	Kisselkar
Tacoma, Wash.	Chase Garfield	Chandler
Tekamah, Neb.	Smith & Bellville	Cole
Titusville, Pa.	Keystone Automobile Garage Co.	Cole
Tucson, Ariz.	Huck-Clarke Co.	Maxwell
Wabash, Ind.	Silas Swank	Cole
Weeping Water, Neb.	J. E. Jenkins	Ford
Winterset, Ia.	Elmer Orris & Co.	Cole
Winkelman, Ariz.	L. E. Hoeye	Studebaker
Worcester, Mass.	Thorvald Hanson	Cole
Youngstown, O.	Dietrich Motor Car Co.	Cole

COMMERCIAL CARS

Columbus, O.	Service Garage & Sales Co.	Service
Phoenix, Ariz.	Edward Rudolph	Federal
Los Angeles, Cal.	M. S. Bulkley & Co.	Perfex

ST. LOUIS, Mo.—The St. Louis Kissel Kar Co., recently incorporated, opened its showrooms on Twelfth street last week.

San Francisco, Cal.—Barry Cool, of the Pathfinder Pacific Motor Sales Co., of San Francisco, has recently taken the agency for northern California for the Liberty Bell, a new warning signal.

San Francisco, Cal.—Bert S. Bingham, formerly branch manager for the Pioneer Automobile Co., in Fresno, Cal., has been promoted to country sales manager for the San Francisco corporation.

Chicago—Frank H. Smith, who joined the sales force of the Lozier Motor Co. at Detroit several months ago, has been made central district manager for the Lozier company, with offices in Chicago.

Detroit, Mich.—Sales Manager E. R. Benson of the Studebaker Corp. of America announces the appointment of W. W. Beeson as manager of the Studebaker branch in Atlanta, to which are tributary the states of Georgia, Alabama, Florida, South Carolina and part of North Carolina.

Media, Pa.—The Schoen-Jackson Co. has appointed the E. J. Edmond Co., 1783 Broadway, general sales agent of Feps carbureters for the New York territory. Arrangements are being made for the establishment of branches on the Pacific coast and in Denver and Chicago.

Philadelphia, Pa.—The contract for the erection of a huge assembling plant for the Ford Motor Co. at the northwest corner of Broad street and Lehigh avenue has been awarded to Irwin & Leighton, of this city. Of reinforced concrete construction, the new Ford building will be ten stories in height, extending 325 feet in Broad street with a depth of 125 feet. When finished the plant will represent an expenditure of $800,000.

Seattle, Wash.—J. W. Prescott, formerly of Spokane, has been appointed manager of the Cartercar factory branch in Seattle.

Minneapolis, Minn.—The Marathon Tire and Rubber Co. has opened a branch at 1104 Hennepin avenue in charge of O. H. Clay, formerly of the Diamond company.

Columbus, O.—R. H. Chidester, formerly of Pittsburgh, has been made manager of the Motor Owners' Supply Co., of 85 North Third street, Columbus.

Chicago—Harry E. Doty has been appointed manager of the Haynes Motor Car Co., of Chicago, Haynes distributor for Illinois, Iowa, Wisconsin and part of Indiana.

Philadelphia, Pa.—W. W. Gawthrop has been appointed manager of the newly established eastern sales branch of the Krebs Commercial Car Co., of Clyde, O., with headquarters in the Abbott building, Broad and Race streets.

Cleveland, O.—The Service Recorder Co., of Cleveland, manufacturers of travel recorders for motor trucks, in addition to maintaining twenty-two branches in the United States, announce the establishing of sales agencies in Ponce and San Juan, Porto Rico, in charge of H. E. Gates, of the Atlas Commercial Co.

Indianapolis, Ind.—A. H. McIntyre, for 5 years identified with the accessory business, has entered the car selling field. He has been appointed general sales manager for New England by the J. I. Handley Co., of Indianapolis, the selling company which is marketing Marion and American cars. Mr. McIntyre will represent both cars in his district, which comprises all of New England. He has established headquarters in Boston.

Seattle, Wash.—O. O. Shellenberger, of Portland, has been made manager of the Seattle branch of Hughson & Merton.

Charlottetown, P. E. I.—W. Grant & Co. has opened a garage here on the corner of Queen and Sydney streets and will carry a line of cars for hire.

Milwaukee, Wis.—A. J. Monday, 321 Fourth street, Milwaukee, body builder, trimmer, etc., has been appointed state agent in Wisconsin for the Detroit demountable rim.

Cincinnati, O.—The Stevens-Duryea Co. has secured a lease on property in the central part of Cincinnati for a service station. George Miller, former agent for the car, has taken on the Cole and the Standard electric. The Velie company has also entered the Cincinnati market and will erect a new building.

Oklahoma City, Okla.—Lightning struck the Chickasha garage at Chickasha, Okla., last week, causing the roof and one wall to collapse, entailing a loss to the building and machines stored of approximately $20,000. There were twenty-three machines in the garage at the time. Several were completely demolished.

Milwaukee, Wis.—W. W. Calahan, of Chicago, has been appointed manager of the Milwaukee-Wisconsin branch of the Goodyear Rubber and Tire Co., 134-136 Oneida street, succeeding Herbert P. Ziegler, who goes to the Chicago branch. Mr. Calahan has been associated with the Goodyear sales department since 1907.

The Accessory Corner

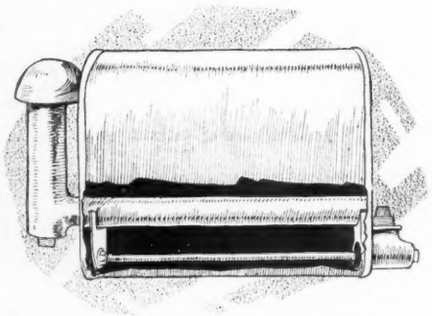


FIG. 1—CUT-AWAY VIEW OF THE LORD AIR CLEANER

The air enters through the umbrella-shaped pipe at the left and is freed of dirt by passage over a reservoir containing oil

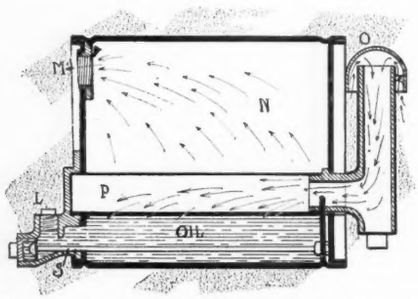


FIG. 2—CROSS-SECTIONAL DIAGRAM OF THE LORD CLEANER

The atmospheric air is shown coming in at O and passing through two chambers and out through opening M to the carbureter

S & L Ford Axle Truss

SUNVOLD & LARSON, Sacred Heart, Minn., are introducing the S & L rear axle truss for Ford cars which is said by the maker to prevent rear axle breakage, axle and drive shaft vibration, gear stripping and the rear axle becoming out of alignment. The truss, which sells for $1.75, may be clamped to the rear axle housing in a few minutes, no special tools or drilling being required. As shown in Fig. 3, the S & L truss is made to brace the differential housing, which construction, it is claimed by the manufacturer, keeps the housing rigid, thus preventing the rear axle becoming out of alignment.

Lord Air Cleaner

Many devices have been offered for cleaning the gasoline which enters the engine of a motor car, but now the Lord Mfg. Co., Brooklyn, N. Y., offers a cleaner for the air which enters the carbureter and makes the atmospheric air fit for motor food. With air minus the solid matter entering the cylinders, it seems that there will be less carbonization in the cylinders, for it is thought that air impurities burning to carbon, deposits on the pistons and cylinders. Further by cleaning the air entering the cylinders there is obtained a slightly better explosion, for foreign matter tends to decrease the explosive properties of a mixture of gasoline and air.

The Lord air cleaner is of the screenless type and is at present in use on locomotives, street cars, etc. The principle of the cleaner is illustrated in Fig. 2 and the traction type as viewed from the outside is shown in Fig. 1. The dirty, atmospheric air enters the umbrella-shaped opening O in Fig. 2 and follows the path designated by the arrows to the chamber P. The dirt from the air is said to be picked up by the oil, due to the adhesive qualities of the latter, and then passes to the expansion chamber N and thence to the outlet M and upon reaching this the air is said to be free from dirt particles. The oil is placed into the cleaner through the opening shown at L and the clean-out pipe is shown at S.

C. O. D. Indicating Instruments

With battery ligting coming into great use due to the prominence of electric starting and lighting generators and motors, the advisability of an instrument which will tell whether or not the battery is performing its functions properly, is to be desired. There is being marketed by the Roller-Smith Co., New York, an instrument called the C. O. D. indicator, which when connected in the battery circuit tells the driver of a motor car whether his battery is discharging, being charged or out of the circuit. One type of C. O. D. indicator is shown in Fig. 4. Here the word "off" appears on the face. There are two other indications reading, respectively, "discharge" and "charge." In the event that the motor is running and the instrument shows "off" there evidently is something wrong with a part of the system, because when the motor is operative the battery is being charged and the instrument will so register. Should the lights be turned off and the instrument read "discharge," there is something wrong in the system. The word "charge" should appear while the motor is running and is an indication that the generator is feeding the battery. The standard type of C. O. D. indicator is designed for duty of 20 amperes and under. The diameter of the body is 2 inches and the depth of the instrument ⅞ inch.

Rubber-aer Tire Filler

The Ruber-aer Products Co., Lima, N. Y., is marketing a tire filler under the name of Rubber-aer and which is said to contain no vegetable oils or corn products and differs from many fillers on the market, in that it is not injected into the inner tube through the tire valve. The filler is a made-up, black substance, resembling rubber and in some of its properties it is exactly like rubber. Special tools are required for filling a tire with Rubber-aer, these being supplied by the maker, who claims that anyone may do the work in less than half an hour. The weight of the wheel is increased twenty to fifty pounds, according to the size of the tire.

Protector Against Theft

The International Automobile Thief Alarm Co., St. Paul, Minn., has brought out a device which will cause a gong to ring as soon as the ignition switch is moved either to battery or magneto side and at the same time the course of the ignition current is diverted so that it is impossible to start the motor. Security of the device is by a Yale lock, the switch and gong being inclosed in boxes.

Cox Oxygen Carbon Remover

Another concern has invaded the field of oxygen carbon removers. The Cox Brass Mfg. Co., Albany, N. Y., is offering such an outfit at $25, the device consisting of a tank containing sufficient oxygen to clean forty cylinders, it is claimed, and all the necessary hose and gauges. The maker claims that with the outfit carbon is removed from every corner of the combustion space in from 6 to 10 minutes. Another feature of the Cox system is that the tank may be refilled, the cost being $2.

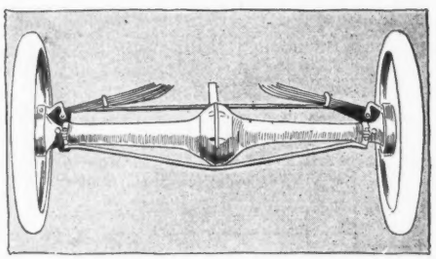


FIG. 3—S & L FORD AXLE TRUSS

When installed on the rear axle of a Ford car this truss is said to prevent gear strippage and drive shaft vibration

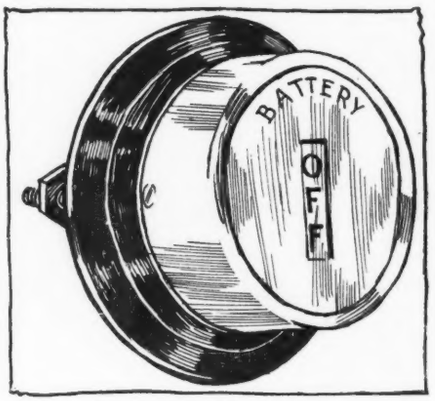
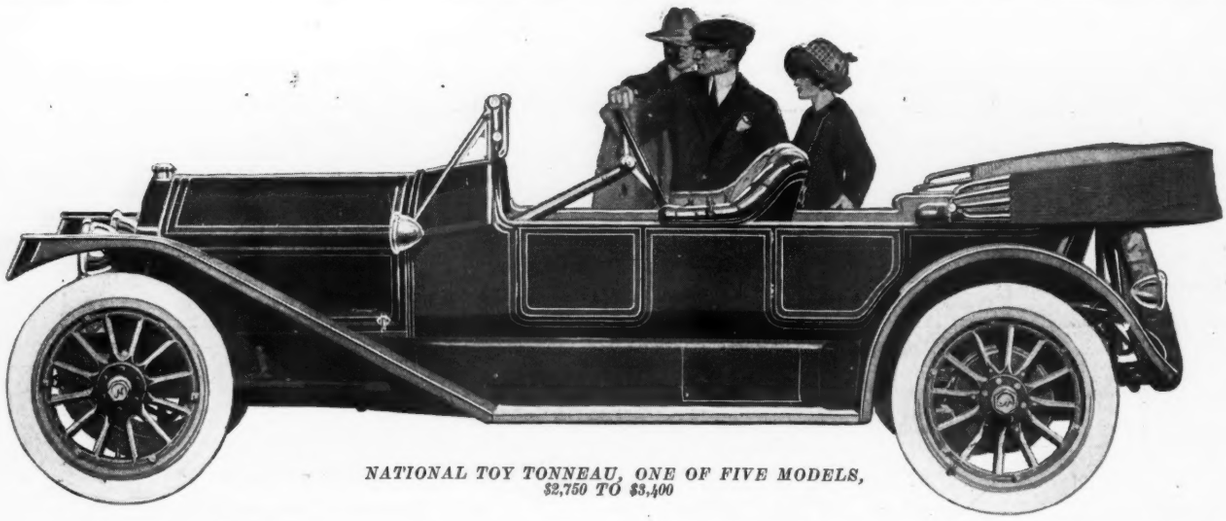


FIG. 4—ONE TYPE OF C. O. D. INSTRUMENT

This indicator tells at all times whether the battery in cranking or starting and lighting systems, is performing its functions properly



NATIONAL TOY TONNEAU, ONE OF FIVE MODELS, $2,750 TO $3,400

National

Built and Guaranteed
By The
National Motor Vehicle Company, Indianapolis, Ind.

STEADY

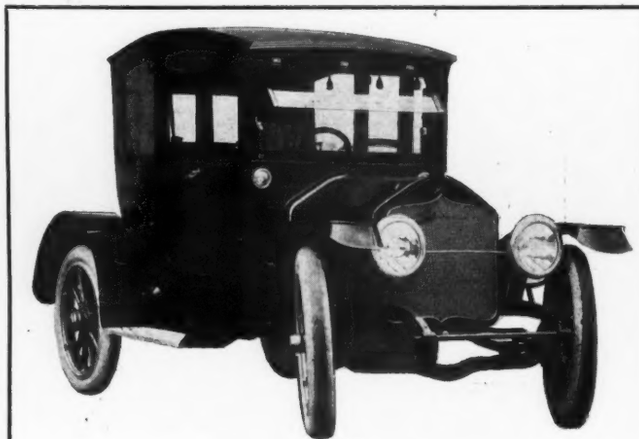
TODAY this word Steady has a vital meaning to you as applied to motor cars.

AND no other car enjoys more, all that Steady implies, than does the NATIONAL car.

—steady growth for fourteen years,
—steadily increasing in output,
—steadily maintaining leadership in quality,
—steadily advanced in design,
—steadily winner of all important contests,
—steadily performing day after day for owners.

BACKED by a Steady company that is reliable and here to stay.

LIMOUSINE INTERIOR



COUPE

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Allen Motor Car Co.....Fostoria, Ohio
Alpena Motor Car Co.....Alpena, Mich.
American La France Fire Engine Co.....Elmira, N. Y.
American Motors Co.....Indianapolis, Ind.
Ames Motor Car Co.....Owensboro, Ky.
Apperson Bros. Automobile Co.....Kokomo, Ind.
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Austin Automobile Co.....Grand Rapids, Mich.
The Avery Company.....Peoria, Ill.

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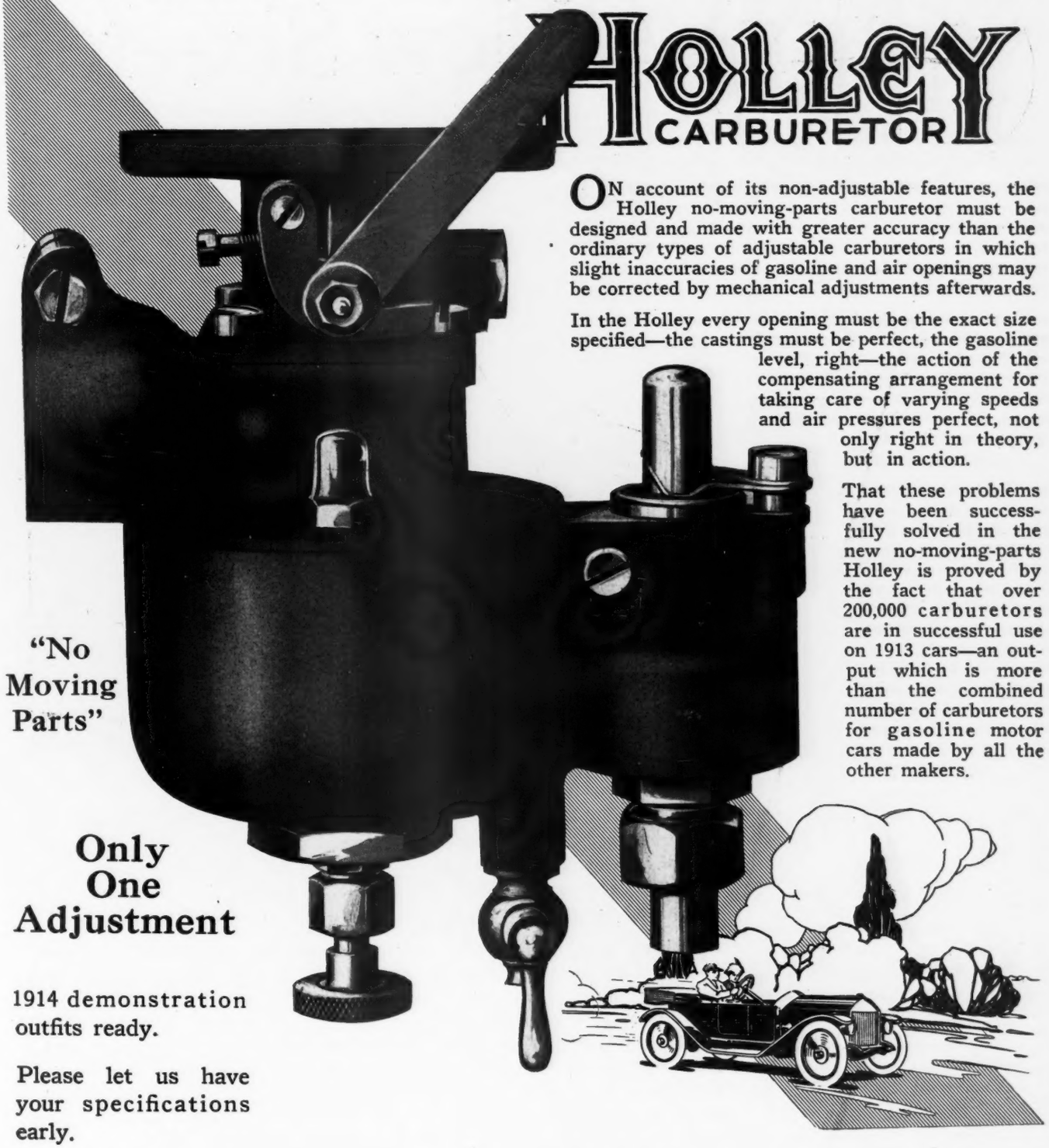
Willard Storage Battery Company
CLEVELAND, OHIO

(41)

Accuracy In Design and Workmanship

HOLLEY CARBURETOR



ON account of its non-adjustable features, the Holley no-moving-parts carburetor must be designed and made with greater accuracy than the ordinary types of adjustable carburetors in which slight inaccuracies of gasoline and air openings may be corrected by mechanical adjustments afterwards.

In the Holley every opening must be the exact size specified—the castings must be perfect, the gasoline level, right—the action of the compensating arrangement for taking care of varying speeds and air pressures perfect, not only right in theory, but in action.

That these problems have been successfully solved in the new no-moving-parts Holley is proved by the fact that over 200,000 carburetors are in successful use on 1913 cars—an output which is more than the combined number of carburetors for gasoline motor cars made by all the other makers.

"No Moving Parts"

Only One Adjustment

1914 demonstration outfits ready.

Please let us have your specifications early.

HOLLEY BROTHERS CO., 131-141 Rowena St., Detroit

REO ACCESSORIES CO.....1220 Michigan Ave., Chicago, Ill. **OMAHA RUBBER COMPANY**.....**Omaha, Neb.**
FOREIGN BRANCH: Holley Bros. Company.....**Coventry, England**

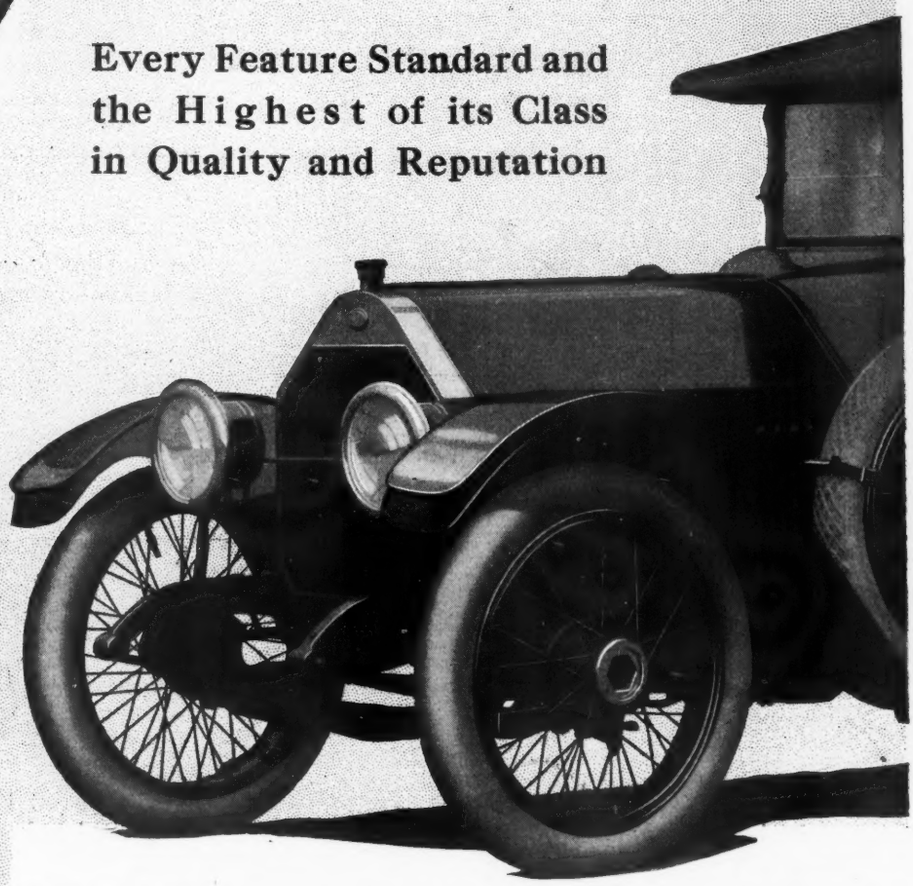
Holley Carburetors are carried in stock at the following addresses: **CHAS. E. MILLER, Home Office:** 97-103 Reade St. and 121 Chambers St., New York

BRANCHES:

New York City.....924 Eighth Ave. Between 54th and 55th Sts.
New York City.....2782 Broadway Between 107th and 108th Sts.
Springfield, Mass.....Bridge and Dwight Sts.
Hartford, Conn.....274 Trumbull St.
Atlanta, Ga.....66 Edgewood Ave.
Brooklyn, N. Y.....1421 Bedford Avenue
Buffalo, N. Y.....824 Main Street
Albany, N. Y.....135 Central Avenue
Boston, Mass.....202-204 Columbus Ave.
Detroit, Mich.....227-229 Jefferson Ave.
Cleveland, O.....1829 Euclid Ave.
Philadelphia, Pa.....318 No. Broad St.
New Orleans, La.....601-603 Baronne St.
Newark, N. J.....274 Halsey St.

A New Six—for

Every Feature Standard and the Highest of its Class in Quality and Reputation



¶ The **S & M** Six is a new car in name, in value, in sales opportunities; but it is already an established car by reason that it is constructed throughout of standard parts that represent the very highest achievement of the best American parts makers. There is nothing in the **S & M** Six that has not already made its reputation.

¶ This car is being built in Detroit; it embraces nothing but 1914 features; has not a left-over anywhere; will not strive for big quantity production; and is built by men who, in addition to manufacturing experience, have had years of valuable experience in the selling end of the business of importing the highest priced, highest grade car in the world,—the Rolls-Royce—and high quality American cars. In fact the **S & M** is brought out because their experience shows that at a medium price the market heretofore has offered no Six with all the right qualifications.

¶ The right qualifications, as you will admit, are as follows: first—a Six—it is the ideal type; second—the best standard parts of the acknowledged specialists; third—light weight, meaning low upkeep; fourth—extraordinary beauty; lastly—a right price.

S. & M. MOTOR CO., Inc.

Specifications:

CONTINENTAL

¶ America's Standard Motor—the finest six cylinder engine produced. Noiseless, light in weight but a giant of energy, developing 58 h. p. by brake test. Three point suspension. Cylinders cast in sets of three. Enclosed valves.

TIMKEN

¶ Acknowledged to be the best in axles and bearings—actually without competition. A guarantee of maximum safety and durability at the points of greatest stress.

BROWN-LIPE

¶ Transmission of highest grade, superior in workmanship, produced by a plant in which $3,000,000 has been invested. No "manufactured" car at any reasonable price can compete with the work of these transmission specialists.

GEMMER

¶ Steering gears specified by over 50% of the leading automobile firms in America. A solid assurance of satisfaction and safety. Known to all motorists as a leader.

JESCO

¶ The ideal lighting and starting system. Does not abuse the batteries, but starts the motor unfailingly. Lightest in weight and most compact in construction.

WARNER

¶ The best speedometer made, accurate, reliable, used on the highest priced cars.

MAYO

¶ Honeycomb, handsome, trouble **proof. Backed by a big, strong company.** No better radiator made.

McCUE

¶ Wire wheels—the latest improvement in motor car construction. Add resiliency and increase tire mileage.

ROSTAND

¶ A windshield beyond comparison, the neatest and most attractive manufactured. Rain vision, clear vision, ventilating. Mirror-plate glass set in solid cast bronze frame, enameled. Special fittings attach top to shield, doing away with leather straps.

¶ All these features are of unparalleled excellence. Yet they are but a few of all the **S & M** offers. Among others may be listed:

Full floating rear axle.
Aluminum hood.
14 vital parts of chrome nickel steel.
130-inch wheelbase.
Left-hand drive, center control.
Short turning radius.
Bosch dual ignition.
German silver radiator casing.
Brewster-style fenders.
2 Thermos bottles.
Genuine hand-buffed leather upholstering.

a New Market

5 Passenger Touring Car, completely equipped, $2485

¶ The photograph of the **S & M** and the specifications at the left tell the story to every experienced motorist and dealer. Continental for motors; Timken for axles and bearings; Gemmer for steering gears; Brown-Lipe for transmissions; Mayo for radiators; Warner for speedometers; McCue for wheels—to enumerate no further, show that, irrespective of price, the **S & M** for quality is not surpassed by any car of American or European manufacture.

¶ This is the Six that dealers have not been able heretofore to supply. Keep this in mind—not a mere desire to be manufacturers, but an intimate knowledge of what the market demands is behind the **S & M** Six. That—plus the further knowledge gained from years of experience, that the car of standard parts, made by specialists, is the best car it is possible to produce and the most economical to produce.

¶ There are other standardized cars. But there are no other cars with the quality of **S & M** standardization throughout.

PRICES:

Touring Car, 5 passenger	$2485.00	Roadster, 2 passenger	$2485.00
Touring Car, 7 passenger	2535.00	Speedster, 2 passenger	2485.00
Limousine, Berline, 7 passenger	$3750.00		

1900 Mt. Elliott Avenue, **Detroit, Michigan**
Branch, 2002 Broadway, New York City

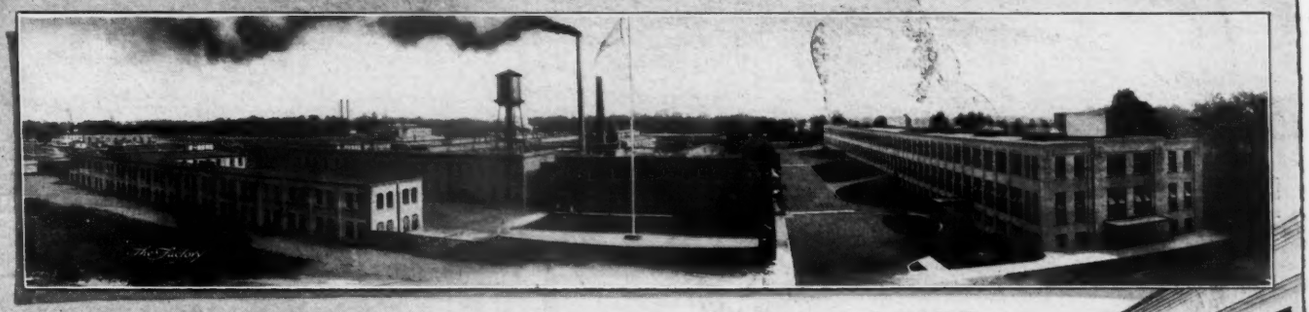
For Dealers:

¶ "A New Six for a New Market" is not a catch phrase. It is based on the six years' experience of the manufacturers of the **S & M.** There are numerous Sixes in the market—a great many of them experiments, and not one of them answering, as does the **S & M,** the steady demand for something that looks better and is better in action—at a better price.

¶ It goes without saying that such a Six must be a proved car. Some other Sixes are proved—by age—at the cost of a big overhead. The **S & M** is proved—by the science and acknowledged preeminence of the specialists who build its parts—without a cent of excess overhead.

¶ The **S & M** offers to the better class of dealers a Quality Car without competition in appearance, in price, and in material. Every purchaser of a car of the class of the **S & M** knows without argument that every one of its parts is the best procurable. The list of firms building these parts is the soundest "selling talk" that ever backed up any automobile.

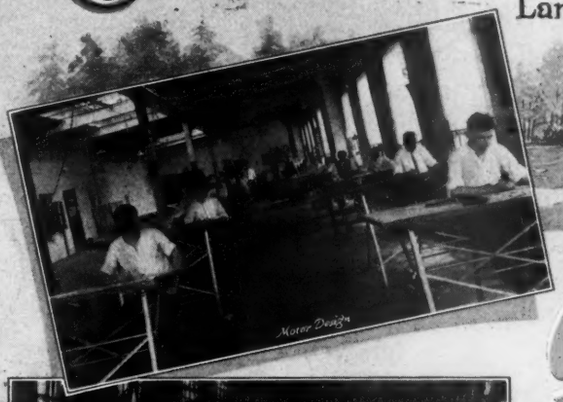
¶ ***And the S. & M. plan of co-operation with dealers is so much better that you should learn of it immediately. Every dealer in quality cars should get the S. & M. proposition at once.***

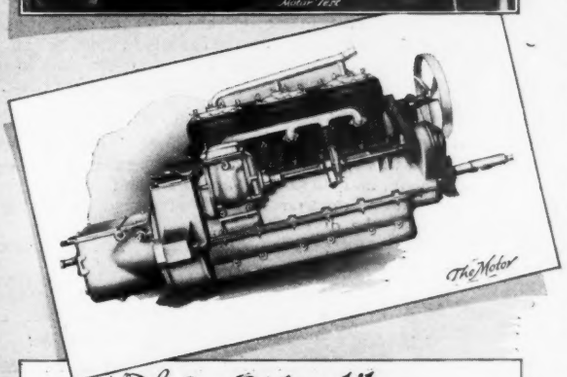


Established 1880 Incorporated 1899

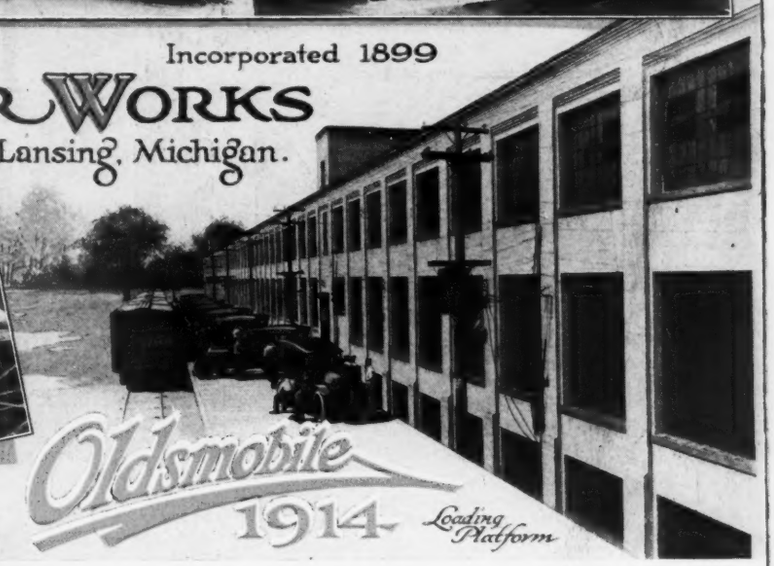
OLDS MOTOR WORKS

Lansing, Michigan.





Four- or Five-Passenger Phaeton, Touring Body Type, $2975. Seven-Passenger Touring Body, $175 Extra. Limousine, $4300



$2975 for a Six Cylinder Oldsmobile $2975

Lower in price, and even higher in quality, than any of its predecessors—the Model 54—1914 Oldsmobile is creating more concrete evidence of live dealers' interest than any other high grade six on the market.

The Price

$2975 practically eliminates competition with dealers handling cars priced from $4000 to $5000—for the Oldsmobile is as good as any of these. The lines of this car are of distinctive Oldsmobile design—a standard which has led all competition, whatever the price.

We Are Six Cylinder Pioneers

Oldsmobile pioneered the six cylinder motor, and it is unnecessary to dwell on the value of the years of ripe experience in the manufacture of six cylinder cars—which is back of Model 54. The Oldsmobile unit power plant 3 point suspensions (bore, 4¼; stroke, 5¼) is a wonderful piece of machinery. In performance and appearance it meets every and all requirements, and astonishes the experienced motorist with its marvelous flexibility and power. Words cannot adequately portray its many good qualifications.

Matters of Comfort, Utility and Refinement

We learned how to build comfort into the Oldsmobile in the early days of the industry. If we knew of any better equipment or little matters of refinement than are on the Model 54 we would be the first to install them. But we have put everything into this car that spells utility, comfort and refinement.

Prompt Deliveries

Never in the history of this Company have we been so well prepared to take care of our dealers by prompt shipment of cars as ordered. We began the delivery of our new models August first, and each day sees the regular quota of cars coming through the factory, tested and inspected down to the minutest detail, on schedule time. You can absolutely count on all delivery promises being adhered to rigorously.

Write Us at Once

In a short while orders for all cars available for the coming season will be closed, and we shall be unable to go beyond this point. We urge, therefore, that if you wish to sell a car that measures up to the highest standards of quality, workmanship and design, you write us at once, letting us know your prospects, size of territory desired, and your facilities for properly representing the Oldsmobile line.

OLDS MOTOR WORKS LANSING, MICHIGAN

Proving up the Differential Carrier of a Timken-Detroit Rear Axle by means of the Carrier Test Gauge. At the right is given the reason for this important check on the accuracy of many operations

The Teeth that Always Fit

Part IV Sequel to The Gear with the Polished Teeth

TIMKEN-DETROIT AXLES

THE driving-gears are finished—ground to the perfect accuracy that is obtainable only by the exclusive method of Timken Gear-grinding.

The differential carrier is finished, too, It is ready to receive the polished gears and to be bolted to the axle-housing.

But one thing remains—we must *know* that the work has been done right: and so we come to the last chapter in the story of "The Teeth That Always Fit."

A Gauge That Proves Many Things

The carrier is turned up on its smaller end and slipped over an upright shaft that forms part of the test gauge. On this shaft are two circular discs that fit into the holes reamed out for the pinion aud pinion-shaft bearings. This fixes the perpendicular axis—the position of the pinion-shaft.

Now discs are fitted into the openings for the differential bearings, and through them is slipped, horizontally, another shaft—which you see plainly in the picture. If the holes for the differential bearings are not perfectly in line with each other the shaft can not pass through both.

But it must also be in a plane at right angles to the upright passing through the pinion bearings. So the operator takes the gauge, which you see in his right hand, and slips it through a hole in the horizontal shaft and down into another hole in the upright shaft.

It goes in; the axis of the drive shafts is in the right plane!

But is it in the right position in that plane? The gauge will tell us. It has an arm that comes down over the shaft—you can see it. He pulls it up, and turns it around so that the arm comes down on the other side of the shaft—next his body. A very slight variation of either of the differential bearing cups from its true position can thus be instantly detected, as the arm will be loose on one side, too tight on the other.

Lastly, the distance is measured from the center of the horizontal shaft, at each end, to the rear face of the carrier (in which you see holes bored for the bolts that fasten it to the axle housing.)

The test is complete. *If the carrier fails to pass, it is rejected without mercy.*

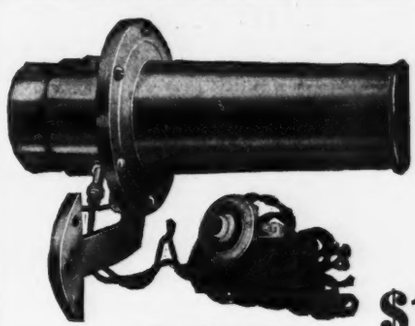
FOR on the correct relation of those "four holes", and that rear face, depend the perfect meshing and quiet running of "the teeth that always fit" as long as they are in the car.

To throughly appreciate the importance of this test in long wear, full transmission of power, quietness, and saving of gasoline, you should read the preceeding chapters in this story. The complete series will be sent you free, postpaid, at your request.

The Timken Detroit Axle Co.
Detroit, Michigan

(25)

Type M $15



Torpedo Type $15

Prices Reduced On Newtone Horns

Quantity production and most advanced manufacturing methods enable us to lower cost 25%.

TO TAKE EFFECT OCTOBER 1st, 1913 } **Type M, $15 "Torpedo," $15 Type N, $15**

During the last three years the demand and production of Newtone Horns has increased nearly 800 per cent.

Average Weekly Production

In 1911 we produced an average of 350 Newtones per week. In 1912, 900 and in 1913—so far—an average of 2,765 per week.
To meet the tremendous demand for these horns we have added new floors, new machinery and a greatly increased force of skilled mechanics, so that we have doubled our present capacity, thereby insuring absolute satisfaction and prompt delivery on future orders.

We invite criticism and challenge competition.

Newtone Superior

NEWTONE Superior

$10 As Heretofore

The "Most Talked Of" Motor Driven Horn

The Newest Newtone is in every essential the Greatest Newtone we have ever produced.

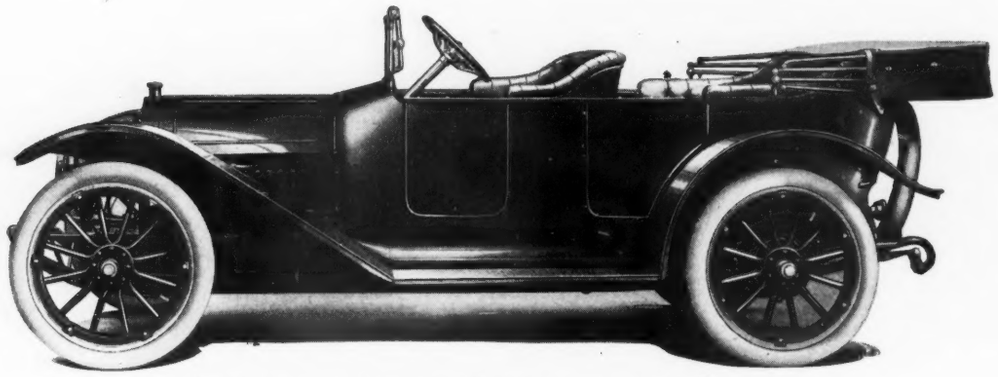
Write for Our Catalog Today

Automobile Supply Manufacturing Company
220 Taaffe Place **BROOKLYN, N. Y.**

Regal

Sell Regal Cars This Year!

Every Demanded Feature-Popular Prices



Model "T"—5 Passenger Underslung Touring Car—$1125

The New Series of Regal cars offers the very latest features —*just what automobile buyers insist upon*—at prices within reach of thousands. These two facts give these new cars an *unprecedented selling power.*

EVERY present Regal dealer believes this will be the *greatest profit-year* in his business history. We are certain of it. We want to convince you.

The first reason is:

Regal Cars

The New Series consists of four models—three of them built on the proven and famous Regal Underslung construction. This method of building—the frame below the axles—gives long, low body lines, insures against "turning turtle" or skidding and saves tires and gasoline. The other model is a big, beautiful, luxurious overhung car. *The second reason is:*

Regal Advancements

We have incorporated the following demanded features as standard equipment on all Regal cars:

Electric starter and lighter. Electric headlights, with dimming attachment. Left-hand drive and center control. Long sweeping body lines enhanced by graceful cowl dash. Switch for starter, lighting switches and speedometer on instrument board. Special attachable curtains. Rain vision and ventilating windshield. Demountable rims. Tire irons, etc. *Add to this a third reason:*

Regal Prices

A dealer *must* sell a *low-priced car* if he expects to make money. Around *$1000* is the *big market* this year. But you *can't* afford to handle a poorly built car no matter what the price is. We offer you the very lowest, consistent prices and cars that can't be built better—that have always *stood up* and always satisfied their owners. *And now the last reason is:*

Regal Organization

Our tremendous growth during the past seven years has been due to the merits and prices of our cars, combined with a careful, sound business policy. We are *permanent* and *financially prosperous.* Our vast factory facilities insure speedy deliveries and efficient factory service.

These are some of the big arguments why you should handle Regal cars this year and get *your share* of the money Regal dealers will make. Now read carefully our specifications.

Specifications—Model "T"

Wheel base, 108 inches. Motor, four-cylinder cast en bloc; bore, 3¾ inches; stroke, 4½ inches. Dual ignition. Cooling, thermo-syphon with fan. Selective type sliding gear transmission, three speeds forward and reverse. Leather faced cone clutch. Steering, left hand with center control. Tires, 32x3½ inches. Demountable rims. Equipment includes Rushmore electric starter and lighter, nickel trimmings, electric head and tail lamps with dimming attachment, electric horn, extra demountable rim, tire irons, mohair top, special adjustable curtains, top boot, ventilating rain vision windshield, speedometer, foot throttle and muffler cutout. Color, dark blue with light blue striping. **Price, completely equipped, $1125, f.o.b. Detroit.**

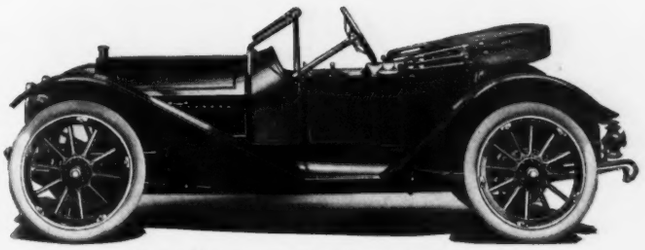
Regal Motor Car Company

Regal

Electric Starter and Lighter—Left Hand Drive-Center Control

Specifications—Model "N"

Wheel base, 108 inches. Motor, four-cylinder cast en bloc; bore, 3¾ inches, stroke 4½ inches. Dual ignition. Thermo-syphon cooling with fan. Cone clutch with leather face. Transmission, selective sliding gear, three speeds forward and reverse. Steering, left hand with center control. Tires, 32x3½ inches. Demountable rims. Equipment includes Rushmore electric starter and lighter, nickel trimmings, electric head and tail lamps with dimming attachment, electric horn, extra demountable rim, tire irons, mohair top, top boot, windshield, speedometer, foot throttle and muffler cutout. Color, dark blue with light blue striping. **Price, completely equipped, $1125, f.o.b. Detroit.**



Model "N"—Underslung Roadster

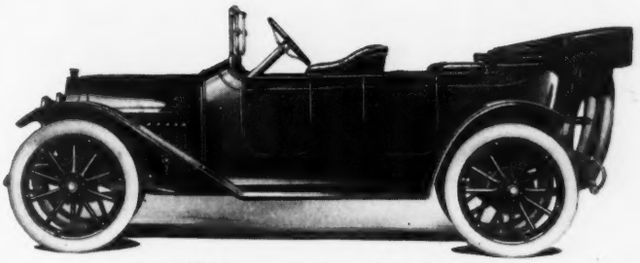
Model "NC"—Underslung Coupe

Specifications—Model "NC"

Wheel base, 108 inches. Motor, four-cylinder cast en bloc; bore, 3¾ inches, stroke, 4½ inches. Dual ignition. Cooling, thermo-syphon with fan Cone clutch with leather face. Selective sliding gear transmission, three speeds forward and reverse. Tires, 33x4 inches. Demountable rims. Left-hand steering, center control. Upholstering, seat and lower part of body buffed leather; upper body and ceiling, blue broadcloth. Equipment includes Rushmore electric starter and lighter, nickel trimmings, electric head and tail lamps with dimming attachment, electric horn, extra demountable rim, tire irons, extra folding seat, speedometer, foot throttle and muffler cutout. Color, dark blue with light blue striping. **Price, completely equipped, $1600, f.o.b. Detroit.**

Specifications—Model "C"

Wheel base, 116 in. Motor, four-cylinder cast en bloc; bore, 4 in.; stroke, 5 in. Dual ignition. Cooling, thermo-syphon with fan. Selective sliding gear transmission, 3 speeds forward and reverse. Cone clutch with leather face. Steering, left hand, center control. Front springs, half elliptic, rear springs, three-quarter elliptic. Tires, 34x4 in. Demountable rims. Equipment includes Rushmore electric starter and lighter, nickel trimming, electric head and tail lamps with dimming attachment, electric horn, extra demountable rims, tire irons, mohair top, special adjustable curtains, top boot, rain vision ventilating windshield, speedometer, foot throttle and muffler cutout. Color, dark blue with light blue striping. **Price, completely equipped, $1350, f.o.b. Detroit.**



Model "C"— Overhung Touring Car

We Want the Right Dealer in the Right Place. WRITE TODAY!

We have some unallotted territory that offers exceptional opportunities to the right sort of men. You may be just the kind of man to handle our profitable line in your locality. Our proposition is fair and square. It gives you a good margin of profits. Our cars sell readily. Every Regal dealer is a prosperous business man. Write or wire us today for our New Series literature, and for our dealer's proposition. Address:

261 Piquette Ave., Detroit, Mich.

106

60 "Six" KISSELKAR 60 "Six"

The Car of Rare Comfort

With its deeply cushioned commodite seats, 142-inch wheelbase, extra large wheels and tires and big, resilient springs, the powerful, silent, smooth-running KisselKar 60 "Six" typifies solid comfort. Under all road conditions—whether over smooth city streets or country hills—the KisselKar "60" maintains its reputation as the car of rare riding comfort, and easily vindicates its title as the dominant value among the "Big Sixes."

Riding comfort is the biggest thing about any car and is the proof of well balanced construction. The final test of comfort is riding in the car. Yet it is possible to judge of comfort without this test, for the factors are known.

Every inch added to the wheelbase means a steadier riding motion and permits the car to be designed on liberal lines, with roomier tonneau, deeper seats and many comfort features impossible in cars of smaller wheelbase.

The generous KisselKar 60 "Six" wheelbase —142 in.—is the basis of its rare riding comfort. No car can equal the comfort qualities of the KisselKar without matching its liberal design and specifications. A careful comparison will prove that few cars do.

There are three KisselKar models: 60-"Six," $3150; 48-"Six," $2350, and 40-"Four," $1850. All fully equipped, electric started and lighted; left hand drive, center control.

The new KisselKars are now being shown by our representatives at over 300 points. See your nearest Dealer for demonstration, or write us for illustrated catalog.

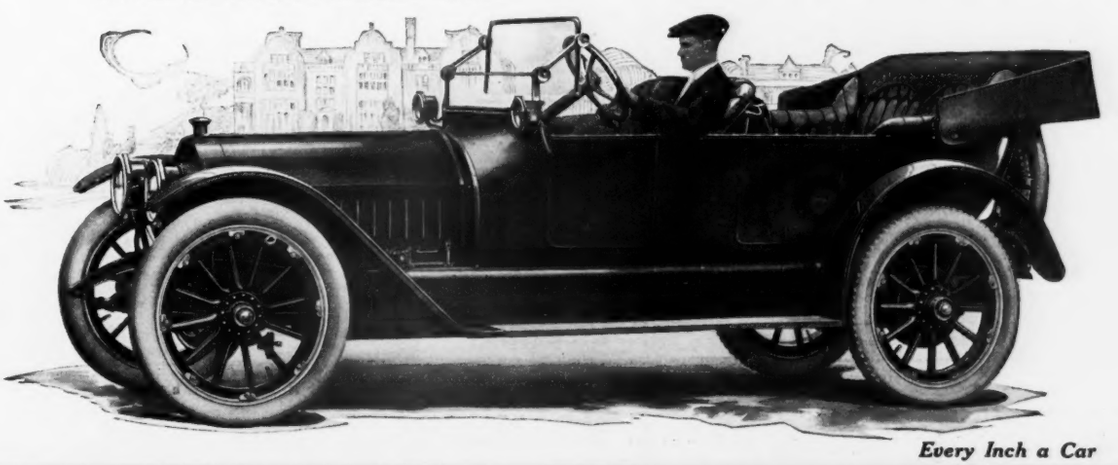
KISSELKAR SERVICE CONTRACT

KisselKar Service is guaranteed to owners under a written contract that specifies in detail what will be done to lower running cost and retard depreciation. The unusual facilities in the way of factory-trained experts and complete stock of replacements at our Service Stations are always at your disposal.

KisselKar Trucks — 1500 lbs. to 6 tons — are used in over 200 distinct lines of business. Write for Truck Catalog.

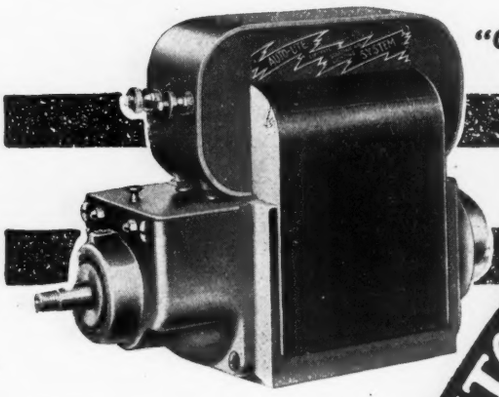
KISSEL MOTOR CAR CO., 121 Kissel Ave., Hartford, Wis.

BOSTON, NEW YORK, CHICAGO, MILWAUKEE, KANSAS CITY, MINNEAPOLIS, ST. PAUL, DALLAS, SAN FRANCISCO, LOS ANGELES, OAKLAND, PHILADELPHIA, Detroit, Houston, El Paso, New Orleans, Washington, Baltimore, Nashville, Duluth, Buffalo, Pittsburgh, Hartford, Conn., New Haven, Albany, Troy, Rochester, Providence, Montreal, Quebec, Toronto, Winnipeg, Calgary, and 300 other principal points throughout America.



Every Inch a Car

I have sold more than one_____car in competition with others of much higher price, because it was equipped with an Auto-Lite Electric Generator."



"Current to Burn"

AUTO-LITE ELECTRIC STARTING and LIGHTING SYSTEM

The new Model "G" Auto-Lite Generator is built with magneto dimensions—can be placed on the bracket provided on the engine for the magneto and driven directly by the magneto shaft, or it can be connected direct to pump shaft—no additional transmission, such as gears, chains or belts being required.

Reaches its maximum output at a car speed of 17½ miles per hour. Begins to produce current at a speed of about 6 miles per hour.

Water and dustproof—gives you high current production at low car speeds.

THE star salesmen of one of the well known automobile concerns made this statement last week in our office. He went on to say—

"The Auto-Lite Electric Generator has given such satisfactory service on_____cars, that I have actually marveled at its ability to keep running day and night without any more attention than I have given the radiator or tires.

I have driven a demonstrator equipped with an Auto-Lite System all over the country, through rain storms, over the roughest kind of roads, and I have yet to find the first fault with it.

The lights are always bright—ready when I want them.

The control is perfect, which is something you can't say about the others.

The Auto-Lite is unquestionably the best electric lighting system on the market today."

These statements were made by a man with long experience in the motor car business.

He travels continuously, is personally acquainted with all of the well-known automobile agents east of the Mississippi River.

Therefore, he is thoroughly posted and knows whereof he speaks.

"THE PIONEER 6 VOLT ELECTRIC SYSTEM"

GET THIS BOOK

Send for our "Handbook on the Care and Operation of Automobile Electric Systems," a book so full of interesting information on all modern electric systems that no automobile owner can afford to be without it.

Explains in detail, functions of the various parts—how to locate and remedy troubles of all kinds—embraces all electrical automobile systems.

The large operation chart which it contains is alone worth the price.

Regular price 50 cents.

Will be sent to you for 10 cents in stamps if you use this coupon.

THE ELECTRIC AUTO-LITE COMPANY

112 MICHIGAN STREET, TOLEDO, OHIO

Branches: New York Boyer Building, Detroit Kansas City San Francisco

Manufacturers of Modern Electrical Starting, Ignition and Lighting Outfits for Motor Cars

This Coupon Saves You 40c

The Electric Auto-Lite Co.
112 Michigan Street, Toledo, Ohio

Enclosed find 10c in stamps for which please send me your handbook.

Name _____

Address _____

_____

Overland 1914

$950

With Gray & Davis electric starter and generator—$1075
Prices f. o. b. Toledo

WE have not merely refined the Overland. We have increased the value—and lowered the price. MORE CAR FOR LESS MONEY is the best selling argument in the world.

The Overland dealer can point out a longer wheelbase, bigger motor, larger tires, and the latest equipment, including electric lights and a more beautiful car.

But the price is lower than ever!

Catalogue on request. Please address Dept. 46.

The Willys-Overland Co.

Toledo, Ohio

Full electric lights
Storage battery
35 horsepower motor
114-inch wheelbase
Timken bearings
33 x 4 Q. D. tires
Clear vision windshield
Brewster green body
with light green striping,
nickel & aluminum trimmings
Mohair top curtains
and boot
Stewart
speedometer
Electric horn

THE GREATEST CAR VALUE FOR 1914

See all others—but examine the KING before you buy

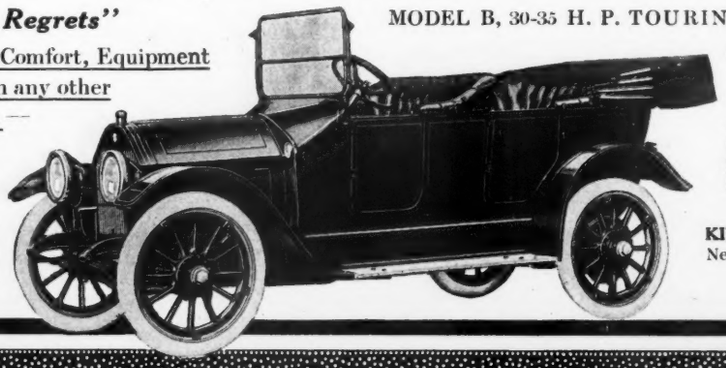
"The Car of No Regrets"

MORE Service, Economy, Comfort, Equipment and Style than can be had in any other car near the KING'S price —

$1095

WITH EQUIPMENT

Ward Leonard Starter and Generator, $100 net additional.



MODEL B, 30-35 H. P. TOURING CAR AND ROADSTER

"None So Easy Riding"

The KING'S patent cantilever rear springs make all auxiliary shock-absorbers unnecessary; prevent "side swing" and assure long life to car and tires.

Write for catalog

KING MOTOR CAR CO., Detroit, Mich.

New York Agency, Broadway at 52d St.

AGENTS—Some choice territory still open. Wire today.

KING

"Soot=Proof" Spark Plugs Never Balk— Over 2,000,000 Prove It

Not all spark plugs will carbonize.

Not all get dirty, grow weak or short circuit.

And not all spark plugs call for frequent replacement.

Mr. C. A. Mezger—after twelve years spent on spark plug problems—has perfected and patented the "Soot-Proof" plug.

This plug is warranted to clean itself. It never clogs, never leaks, never short-circuits. And it lasts for years.

Its use forever ends all spark plug worries.

It is built with a double chamber. Thus it offers at least three times the resistance of any other spark plug made.

It outlasts any other by two or three times over.

This has all been proved to hundreds of thousands. For over two million "Soot-Proof" plugs are now in use on the leading cars of America.

One "Soot-Proof" plug will prove this to you. If you have any doubt, use old-type plugs with it. Note the difference in results.

Do this now. Think what it means to have spark plug troubles forever wiped out. This spark plug will do it—that is guaranteed.

Get them from your dealer. If he can't supply, find a dealer who can. Or send to us direct. In replacements alone these "Soot-Proof" plugs will save many times what they cost you.

C. A. Mezger "Soot-Proof" Spark Plugs

C. A. MEZGER, Inc., 15 Canal Place, New York

Philadelphia, 1427 Vine St., Petry-Cassidy, Inc.
Chicago, 1430 Michigan Boulevard, F. E. Sparks
Detroit, Ford Building, H. E. Butcher
San Francisco, 530 Golden Gate Ave., Hughson & Merton
Portland, 329 Ankeny St., Hughson & Merton
Seattle, 924 E. Pike St., Hughson & Merton
Los Angeles, 1229 So. Olive St., Hughson & Merton

The Foreign Trend

The builders of motor cars abroad are constantly introducing new ideas, new body designs, new equipment, and new methods of construction.

There are wire wheels and worm drive now. And other things are promised.

But some things there, as here, are standard.

One is The Jones Speedometer.

Seven years ago The Jones became Europe's most popular speedometer.

It won the Royal Automobile Club's gold medal for all around superiority in a test that covered 2,000 miles and lasted 30 days.

It was placed on the cars of the King of England, the Emperor of Germany, the Czar of Russia, the King of Italy, the King of Spain, and the Kings of Siam, Norway, Sweden, Denmark and Belgium. The President of Switzerland and the President of France, and hundreds of other notables used it. It is used by these rulers and thousands of others on the best cars today.

No other speedometer ever gained such prestige or was ever so widely sold abroad.

No other sells there today like the Jones. The love of new things—the foreign trend—doesn't dislodge the Jones.

It is regarded as the Standard Instrument because of its accuracy. And nobody ever thinks of displacing it.

The makers of thousands of American cars are factory-equipping their product this year with the New Jones Speedometer.

They expect their cars to be used the year 'round and they know the Jones isn't affected by temperature.

The Jones is the Universal Speedometer. Makers and owners are finding this out. It is accurate, *always*. The simplest in principle. And the longest lived.

It's the product of Jos. W. Jones, the inventor of the speedometer as used on motor cars. Nothing else will ever serve like the Jones Speedometer.

Let us send you the man who knows it in detail and can give you the fullest information in regard to placing it on your car.

This is the gold medal presented to The Jones Speedometer by the Royal Automobile Club of Great Britain and Ireland. Eleven different instruments competed in the test — foreign and American Makes. The Jones made the only perfect score on seven points of superiority.

And the Jones is the only speedometer that has ever won this medal.

THE

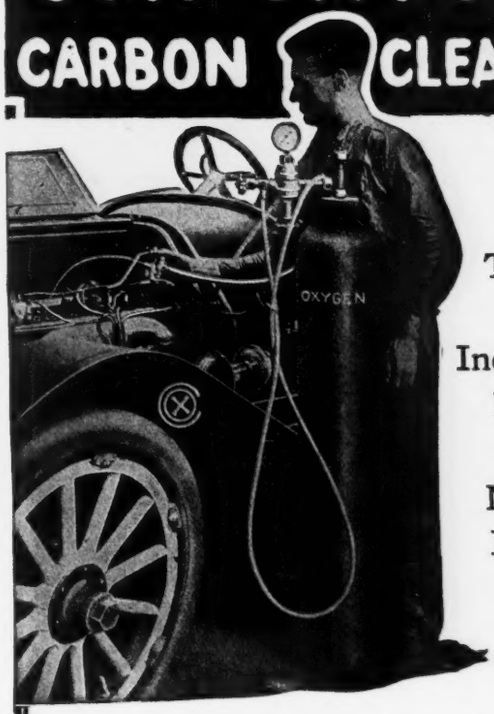
JONES SPEEDOMETER

Broadway at 76th Street NEW YORK CITY

Branches New York, Broadway at 76th St.; Boston, 109 Massachusetts Av.; Philadelphia, 1427 Vine St.; Chicago, 1430 Michigan Av.; Baltimore, 217 W. Saratoga St.; Detroit, 872 Woodward Av.; Buffalo, 20 Goodrich St.; Pittsburgh, 5904 Penn Av.; Cleveland, 1845 Euclid Av.; Charlotte, 209 Church St.; Memphis, Madison Av. and Fourth St.; Minneapolis, 800 Hennepin Av.; Omaha, 1608 Harney St.; San Francisco, 1436 Van Ness Av.; Los Angeles, 408 W. Pico St.; Portland, Ore., 71 Seventh St.; Seattle, 1710 Broadway; Indianapolis, 1201 State Life Bldg.; Atlanta, 35 N. Pryor St.; New Orleans, Baronne and Perdido Sts.; Birmingham, 18 S. 20th St.; Denver, 1600 Broadway; Newark, N. J., 283 Halsey St.; Albany, N. Y., 133 Hudson Av.

Foreign Agencies J. Millen & Son, Ltd., Montreal, Toronto, Winnipeg, Vancouver; Markt & Co. (London), Ltd., London; Markt & Co., Hamburg, Milan, Vienna, Barcelona; A. A. Kampfraath (Brussels), Ltd., Brussels, Amsterdam: Severin & Co., St. Petersburg: G. Bruggemann, Moscow; Y. D. Rose, Paris: William D. Easy & Co., Sydney, Australia; The Tarrant Motor Co., Melbourne, Australia; C. E. Helvie, Manila, P. I.; Adams, Ltd., Christchurch, New Zealand; Markt & Schaefer, Co., Rio de Janeiro, Brazil; Buenos Aires, Argentine; Mexico City, Mex.; Habana, Cuba; San Juan, P. R.

COX OXYGEN CARBON CLEANER



New
Thorough
Quick
Inexpensive
Harmless
Efficient
Necessary
Profitable

The first really efficient and thorough method of cleaning carbon out of the cylinders is the new Cox Oxygen Carbon Cleaner. It consumes every particle of carbon, even in corners where it could never be scraped out, without the slightest possibility of harming the cylinders.

It takes from 6 to 10 minutes to clean each cylinder, averaging 30 minutes for a four cylinder motor and 45 minutes for a six. Any workman can do it. Does not require experience or expertness. Absolutely safe to handle.

For Public Garages

The profit possibilities for you in the Cox Oxygen Carbon Cleaner are only limited by the number of your customers. You do the work in one-tenth the time and only a fraction of the cost of any other method. Motorists will pay you well to clean their cars regularly. It is just as necessary as washing the car. This new method will quickly establish the custom of regularly cleaning.

For Large Private Garages

For private garages in which more than one or two cars are kept, the Cox Oxygen Cleaner is a good investment. It pays for itself in the greater economy and improved running of the car.

Price and Selling Plan

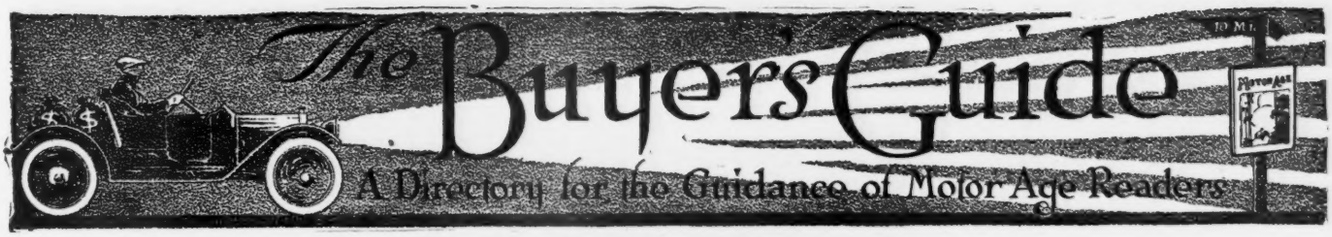
The complete outfit costs $25. The tank is loaned—no charge made for same. You are charged only for the refills. Each tank contains sufficient oxygen for 35 to 40 cylinders. Refilling tanks costs $2.00. This is the only expense.

Write for information *now*

COX BRASS MFG. CO.
ALBANY, N.Y.
1779 Broadway
New York City
870 Woodward Ave
Detroit, Mich

COX BRASS MFG. CO., Albany, N. Y.
Gentlemen: Please send me full information about the Cox Oxygen Carbon Cleaner.
Name.....
Address.....
City.....
State.....
M. A.-10-27

When Writing to Advertisers, Please Mention Motor Age.



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MOTOR CAR
MOTOR CYCLE
MACHINISTS'
BICYCLE
SUPPLIES AND BICYCLES

WHOLESALE ONLY DEALERS, GET YOUR NAME IN

MOTOR CAR SUPPLY COMPANY
1451-1453-1455 Michigan Ave., Chicago

Automobile, Motorcycle and Bicycle Supplies

Ask for catalog "M"
Dealers only

THE BECKLEY-RALSTON CO.
Mich. Ave. & Randolph St., Chicago

FEPS CARBURETOR

"A Giant in Power —A Miser in Fuel"

25% to 50% more mileage

Write for illustrated descriptive booklet.

Schoen Jackson Company, Media, Pa.

AUTOMOBILE TOPS

Write for catalogue and prices.
We can save you money.
BUOB & SCHEU, Court & B'way, Cincinnati, O.

The "Yankee" Silent Muffler has no complicated parts to become clogged. No back pressure, and silent. Made in various sizes. Write for free catalog.

Manufactured by
THE "YANKEE" CO., Utica, N. Y., U. S. A.

THE FAMOUS Packard Auto Cylinder Oil
Will not carbonize. A perfect lubricant
GREENSLADE OIL CO.

Main Office: DETROIT, MICH.
Pacific Coast Agency
George L. and J. A. McPherson, Portland, Ore.

When You Read **Motor Age** You Read the Best

GUARANTEED FISK CASINGS, 36 X 4 Q. D. CLINCHER HEAVY CAR TYPE. WHILE THEY LAST AT $20.00 EACH.

The above casings have run less than twenty-five miles and carry the factory serial number and are fully guaranteed.

Chicago Automobile Supply House
1355 So. Michigan Boulevard, Chicago, Ill.

The PARISH & BINGHAM CO.
PRESSED STEEL
FRAMES
Write For Estimates
CLEVELAND - - - OHIO

—Buy BETTER Springs—

Guaranteed against breakage & sagging, at less price than that of car factories.

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CLASSIFIED ADVERTISEMENTS - (Continued from Page 96)

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AUTOMOBILES—HIGH CLASS, RELIABLE cars at prices representing the greatest values in New York. Space limits us to give you but an idea of the dozens of attractive propositions we offer: Cadillacs, '12, touring, $850; '11, demi-tonneau, $500; '11, roadster, $400; '10, touring, $360. Hudsons—'13, touring, $1000; '12, touring, $700; '11, roadster and touring, $300. Chalmers, '12, touring, $600; '10, touring, $250. Ford, '12, touring, with extra roadster body, $250; '11, touring, $200; runabout, $150. Buicks, '10, roadster, $175; toy-tonneau, $200. To those who desire the rakish type of low hung roadsters we offer among others '12 Mercer; '13 Stutz Bearcat; American Scout; Regal; Paige-Detroit, and Hupmobile "32" at sacrifice prices. Seven passenger cars of great variety—Packards, Pierces, Peerless, etc. A great selection of limousine, landaulet, coupe and taxi-bodies, $50 up. It will pay you to pay us a call tomorrow. King-Shonnard Co., Dept. 2, 1919 Broadway, New York City.

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Until Friday, Sept. 12th, this car can be seen at the factory of the Norwalk Company in Martinsburg. After that time at the private garage of Geo. R. Bready, Harpers Ferry, W. Va., where a competent chauffeur will be at the service of prospective buyers.
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FOR SALE—MODEL "M" FORTY HORSE-power White Steamer, beautifully equipped and in A1 shape. Has kerosene burner and works fine as silk. Will sacrifice. Address Box D 470 c|o Motor Age. w

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FOR SALE—1 STUDEBAKER "35" COUPE, absolutely new with full equipment. List price $1,850 F. O. B. factory. Will sell for $1,550, account of handling a different line of cars for the coming season. Also 1 Studebaker "20" Touring Car in first-class condition $500, and 1 Studebaker "30" 1912 Touring Car in first-class condition $650.
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FOR SALE—1913 MOON DEMONSTRATOR, Model 48 K, run 1,400 miles, better than new; will be sold at a bargain. Address Box D 502, care Motor Age. p

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Includes parabolic reflectors, tungsten bulbs, wiring switch and free delivery.
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Special 40 H. P.	15.00

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Any other make required at equally low prices.
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We have 150 Rayfield carburetors, regular $20.00 kind. Our price, $8.20 while they last.
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Special price on Ford seat covers. We make a specialty of Ford commercial bodies.
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Polish. Small capital; profitable work.
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For slippery weather. HANDI-HOOKS put them on for you in mud, snow or on garage floor in one-third the time, without soiling hands or clothing. Pair sent on receipt of 50 cents.
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New 4-passenger tops, suitable for Flanders 20 Suburban Cars and Buick 10 Surrey. Top only $5.00
New Everitt 6-48 Silk Mohair Tops complete with curtains and dust hood...$18.50
Send in your check while tops last.
AUTOPARTS MANUFACTURING CO.,
Detroit, Mich.

TOURING, ROADSTER, RACING BODIES.
Seats, special and stock sizes. Radiators, hoods, tanks and fenders for any car. Get our prices.
Auto Sheet Metal Works,
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TOPS BUILT, RECOVERED AND REpaired.
C. G. Meyer & Son, Tiffin, Ohio.

TRUFFAULT-HARTFORD SHOCK ABsorbers; $45.00 kind; $20.00 set of four.
PURITAN MACHINE CO.,
417 Lafayette Blvd., Detroit, Mich.

TWO CYLINDER ENGINE, $20; REAR axle for small car, $12.
M. A. Smith,
Lansdowne, Pa.

UNION OXY CARBIDE CO.
Manufacturers of Portable (weight 40 lbs.) and stationary welding, cutting or lighting plants; supplies of all kinds. Agents wanted. Fulton & Enfield Sts., Brooklyn, N. Y.

WE MAKE FORD RACING TYPE BODIES in several models for immediate delivery.
AUTO SHEET METAL WORKS
1532 Michigan Ave., Chicago, Ill.

WE NOW HAVE BUT A FEW 30-35 AND 35-40 H. P. motors ready for shipment. Complete with magneto, coil and clutch. F. E. Alford, Goshen, Ind.

WESTON MOTT HIGH GRADE REAR axles, $45.00. Other bargains, too.
PURITAN MACHINE CO.,
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WRITE THE GUN METAL FINISH CO., 313 Powers Blk., Decatur, Ill., for free samples of ELECTRO-KNICKEL POWDER, for plating automobile trimmings. Will put on as heavy a coat of metal as an electroplating bath.

4 CYL. 4 CYCLE, 25 H. P. NEW MOTORS, overstock, 3 bearing crank shaft, large bearings, self-contained oiling system, complete with timers and carburetors, $105.
Kermath Manufacturing Company,
Detroit, Michigan.

50 H.P. 4-CYL. WISCONSIN MOTOR 4¾x5½, enclosed valves, carburetor, timer, spark plugs, 4-cyl. coil, fan, complete, perfect condition, good as new. First check $175 takes it. Four-cyl. Bosch double racing mag., 8 sparks, cost $125, will sell for $50.
Chas. R. Spohr,
R. R. 9, Dayton, Ohio.

50% GASOLINE SAVING MACHINE
AUTOMATIC GUARANTEED. PRICE $4. The installing is very simple and can be done by the owner himself in a few minutes. Dealers write for terms.
EXCELSIOR AUTO SUPPLY CO.,
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Chicago.

50 NEW PRESSED STEEL FRAMES 163" long, 34" wide. Each $10.00. Send for sketch.
Lucas & Son, Bridgeport, Conn.

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FIFTY CARS WANTED FOR CASH
Have customers waiting; if you want to sell your car quick, consign it to us; no charge whatever; we get our profits over your net figure; it is your privilege to remove car at any time without notice; will send for your car free within 200 miles.
American Used Motor Car Co.,
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500 Bergen Street Near Flatbush Ave.

FORD CAR STOLEN

License No. 74987 Ill., car No. 165,791, engine No. B8862. Notify M. Bristle, Sheriff, Ford Co., Ill., and obtain reward of $50.00.

FOR SALE—QUARTER SECTION IMproved land in Minnesota, at a bargain. Will take 1913 Roadster as part payment. Address Box D 505, c|o Motor Age. k

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WANTED—PREST-O-LITE TANKS. WE pay the following prices:

A. Presto Tanks (large)	$9.00
B. Presto Tanks (medium)	7.50
E. Presto Tanks (small)	6.00

Ship in any quantity C. O. D. or S. D. B. L.
ERWIN GREER & COMPANY,
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A CONSULTING ENGINEER OR DEsigner who can produce results desires to connect with a company manufacturing automobiles. Thirteen years' experience and best of references furnished. Address Box D 515, c|o Motor Age. w

FORD REPAIR MAN AND DEMONSTRAtor desires change; steady job; working knowledge of all cars; married, temperate, industrious. Address Box D 516, c|o Motor Age. o

POSITION WANTED AS FOREMAN OF automobile repair shop by first class mechanic of long experience. Desires a position that will be permanent and where good salary will be paid for faithful and efficient service. West or Northwest preferred. Address Box D 501, c|o Motor Age. c

POSITION WANTED AS MANAGER FIRST class garage or foreman first class repair shop. Eight years' experience. Expert mechanic; reliable, sober. Only solid firms answer. Further particulars address R. J. Marquard, 405 No. 6th St., Springfield, Ill.

POSITION WANTED BY AN EXPErienced mechanic and driver, with some northern owner of a high-grade automobile, as chauffeur during the summer and fall; absolutely sober and reliable; for further particulars address Box D 447, c|o Motor Age. r

POSITION WANTED BY EXPERIENCED machinist and driver. Drove a car to California last fall. Am familiar with the route. Absolutely sober and reliable. If you want a good chauffeur, address Box D 513, c|o Motor Age. n

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BIG MONEY SELLING OUR LINE. $10.00 to $50.00 profit on each sale. Great demand. Experience unnecessary. Exclusive territory to hustlers. Write C. Hemple, Sales Mgr., 175-F No. Sangamon, Chicago. g

ENGINEERS, SUPERINTENDENTS, Works Managers, Designers, Production and Efficiency Engineers, and Draftsmen with automobile experience. Inquiries confidential; record must stand investigation when desired. The Engineering Agency, Inc.—20th Year—Chicago.

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WANTED—AN AUTO SALESMAN TO sell Overland and Ford cars. State salary or commission expected. Whittlesey Garage & Mch. Co., San Benito, Texas.

WANTED AN EXPERIENCED MAN TO handle position as Salesmanager in Wholesale Automobile Accessory firm. Prefer one acquainted with this line or the hardware line, but not an entirely essential qualification. However, must have road experience as well as experience in handling salesmen. Opportunity for advancement.
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WANTED: NEAT APPEARING AUTO MECHANICS, with good references, in all small towns to make installations of automobile devices for us. Address: Halliwell Co., 408 West Pico St., Los Angeles, Calif.

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Splendid location for auto accessories, tires, etc., located on Wabash avenue, opposite Coliseum. Rent reasonable; long or short lease. A. A. Newman, Room 302, 8 So. Dearborn St., Chicago.

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FOR SALE OR RENT—COMPLETELY equipped automobile or engine manufacturing plant, located in large middle west city, attractive labor, raw material supply and railroad facilities. Plant can be operated on short notice. Address Box D 518, c|o Motor Age. s

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In Southern Indiana, 50x150, concrete construction, concrete floor, no posts, everything modern. City of 8,000 population. Takes ($10,000) to buy building, ground and stock. Inquire Box D 497, c|o Motor Age. mc

LET US DO YOUR DESIGN,
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EXCEPTIONAL BARGAINS IN NEW AND used tires and tubes. Repairing a specialty. All work guaranteed. Write or call for prices. Empire Vulcanizing Co., 2400 Wabash Ave., Chicago. Cal. 4565. Open evenings.

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Before buying your tires, consult us. We guarantee to double your mileage and save you money in the transaction.

We send you any shoe of standard make with the maker's guarantee at a low figure.

We also send you with each shoe one of our Security Reliners which is guaranteed absolutely to double the tire makers mileage and thereby save you untold expense, at a special price according to the size desired.

You can't afford to overlook this proposition. Specify size of shoe desired, and get one of the best propositions ever offered to any owner.

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Agency Dept.
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NON-SKID TIRES.
All standard makes at the following prices:

Size	Price	Size	Price
30x3½	$14.50	34x4½	$27.00
32x3½	16.00	35x4½	28.00
32x4	20.00	36x4½	29.00
34x4	22.50	36x5	31.50
36x4	24.50	37x5	32.50

I do not carry any but standard make tires or deal in inferior brands. I will ship any size tire listed above to any part of the U. S. upon receipt of 10% of order, balance C. O. D. M. C. Moran, 334 Amsterdam Ave., New York City.

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Well known make of new factory second tires in two sizes only, 34x3½ Q. D. clincher or regular clincher, smooth, at $9.50 each. 30x3½ Dunlop or straight side, smooth, $8.25 each. Will furnish Goodyear rings at $.75 each with tire order. Ten per cent with order, balance C. O. D., subject to inspection. Kastner Tire & Rim Co., 2112 Michigan Ave., Chicago, Ill.

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Your opportunity if you own a Ford, have salesman's ability, and live in a small town where we have no agency for

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Twenty-five per cent Heavier—Tougher—and Stronger cases—and Heavy Red Tubes.

These tires make your car ride easier—give you more mileage, save too frequent blowouts and other tire trouble.

We make 30 x 3½ and 30 x 3 cases and tubes only—make them in large quantities from the best Para Rubber procurable and 400 lb. test fabric. But by eliminating detail expense necessary in factories where 104 different sizes and types are made we have reduced manufacturing costs and pass this saving along to our customers.

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Get your name in today before your neighbor does.

C. H. STODDARD RUBBER TIRE WORKS

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All standard makes. Call or send for price list. Repairing by experts.
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I will sell you good wrapped tread clincher tires cheaper than any one in the United States. New 1913 stock. 34x4 Case, $14, all other prices accordingly. Write for prices.
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New 1913 fresh standard makes. We're buying in large lots direct from the best manufacturers of Akron, O., and selling at a small profit to move it quickly. Send for Price List. Serlin Tire Co., 1073 14th Place. Chicago, Ill.

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Get our exchange proposition on new K-W for old equipment.
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1913 DEMONSTRATING MAGNETOS of all makes, at bargains, to make room for 1914 magnetos.
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GUARANTEED BATTERIES.

6 volt	140 Amperes	$16.00
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A BARGAIN; STORAGE BATTERIES, 6-80 and 6-160; guaranteed; all makes, new and used, $3.50 to $10 for short time only. 4105-7 Cottage Grove Ave., Chicago. a

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Build your own. Plans, specifications and lumber list complete. Mailed upon receipt of $1.00.
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GOOD PRIVATE AUTO GARAGES, $58 up, 14 sizes; wood and steel; well built and sold at honest prices. Write before you buy. J. A. Catherman, Beaver Springs, Pa.

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General Machine Work
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Welding all kinds of metal
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We manufacture and repair springs. Proper action compound put in springs. 1331 Jackson Blvd., Chicago, Ill.

CYLINDERS REGROUND
And fitted with new pistons and rings.
EXPERT REPAIRING AND REBUILDING
Old parts satisfactorily repaired or duplicated. Cracked cylinders, gear cases, etc., perfectly welded and machined. Aluminum, bronze and brass castings of any design.
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CYLINDERS REGROUND, NEW PISTONS

and rings fitted, gear cutting, of all kinds and materials, transmission and bevel gears, piston pins and push rods of chrome nickel steel, hardened, tempered and ground; guaranteed better than factory; old piston pins reground and fitted to your new pistons; old push rods reground and furnished with new guides, crank shafts, connecting rods, valves, crank cases, any part for your auto or motor; reproduced same as original but better; phosphor bronze bushings carried in stock. Send old or broken parts to go by. The shop of quality.

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CYLINDERS REGROUND AND FITTED with new pistons and rings for $7 to $11 per cylinder. We do this class of work exclusively and are thus able to give you the highest class of work at these prices. The Crown Machine Shop, Crown Point, Ind.

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If your seat linings are soiled, now is the time to have them retrimmed. New seat covers will make your car look like new for fall and winter use. Autos and carriages retrimmed and relined.
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Expert repairers and reglassing of all kinds. All work guaranteed. A trial will convince you. 1919 S. Wabash Ave., Chicago.
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REPRESENTATIVES WANTED FOR THE Holloway Kerosene Carburetor, just ready for market. Present equipment for Ford cars. Other equipments will be ready within few weeks. Tested under all conditions past two years, including exhaustive tests under observation of Purdue University, Lafayette, Ind. More power and mileage. No smoke. Switch from gasoline to kerosene in ten to thirty seconds. Guaranteed. Retail price, $15.00. Not complicated. Prefer Ford agencies. Others must be substantial and own Ford car. Holloway Kerosene Carburetor Co., Lafayette, Ind.

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For a good class of automobile goods that are winter sellers.
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TIDMAN & GOUGH INVITE CORREspondence from American Manufacturers of Automobile Accessories, Patent Novelties, etc., suitable for the English market. Sound connection with all leading houses. Central City Showrooms. Address: Tidman & Gough, 47, Moor Lane, London, England. a

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A-A-A RADIATORS MANUFACTURED and repaired. Radiators of any make repaired and returned same day. We can make any style radiator and ship in three days.
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ALL KINDS OF AUTO RADIATORS, hoods, fenders, lamps and windshields, etc., rebuilt and repaired. All work guaranteed. Also general sheet metal works. Phone or mail order. L. Blumenfeld & Co., 1919 Wabash Ave., Chicago. Tel. Cal. 4583.

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Expert repair work on Radiators, Hoods, Fenders, Dashes, Tanks and Drip Pans.
We guarantee all our work.
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CHICAGO MANUFACTURING COMPANY,
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We are the only radiator manufacturers in Chicago making a square tube radiator. New guaranteed cores placed in old radiators. We also manufacture Hoods, Fenders, Tanks and Pans and do guaranteed repair work. Prompt service.

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We are offering the following guaranteed radiators, which we build, at reduced prices:
Ford Model T.....$21.50
Buick Models 16-17-19..... 34.00
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New cores built in old radiators. All repair work guaranteed. Phone Calumet 1191.

ONLY RADIATOR FACTORY IN NORTHwest. Eleven years knowing how. Why send your Radiator down East when you can ship it to us; save time, Express, Freight, Money, and get best workmanship. Prices right. Make new Radiators; allow for old one.
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WELDING OF ALL KINDS OF METALS.
Cast Iron and Aluminum a specialty.
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Autogenous welding of all metals, such as crankcases, cylinders, etc. We positively guarantee all work. Tel. Calumet 3563.

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Welders of all metals.
Aluminum cases a specialty.
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AUTOGENOUS WELDING.
Automobile cylinders and crankcases a specialty. We guarantee the welds.
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All metals brazed and welded are guaranteed. Experts on aluminum welding. Send for circular on aluminum welding. 1615 Wabash Ave. Tel. Calumet 5286.

BROKEN CRANKSHAFTS, CRANKCASES, cylinders, flywheels, gearteeth, pistons perfectly welded and machined, ready to replace. Scored cylinders made new. Booklet. Atlas Welding Works, Rahway, N. J.

CYLINDERS, JACKETS, FRAMES, CRANK Shafts, Tanks. All work guaranteed.
Brooklyn Welding Co.
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JOHNSON'S WELDING & AUTO REPAIR Co. Cracked and broken automobile and machine parts made serviceable at a fractional cost of new. Prompt service and highest quality of workmanship guaranteed. 714 South Wabash Ave., Chicago, Ill.

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Springfield - Boston - Hartford - Holyoke-Bridgeport-Salem. Aluminum cases and cast iron cylinders a specialty. Five shops with five years' successful experience.
Ask for our printed guarantee.

WELDING—CYLINDER CRANKCASE AND Crankshaft Welded. Cylinders rebored, $7.00 to $11.00 a cylinder, including piston, 3 rings. Sterling Engine Company, 331-333 S. Clinton St., Chicago, Ill.

WELDING
Cast iron, aluminum and all metals.
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WE WELD AND ABSOLUTELY
Guarantee
our welds to hold, cylinders (cracked in or outside), crankshafts, aluminum crankcases, transmission cases, housings, etc., by the Oxweld process of welding and cutting metals.
Estimates furnished for job or repair welding and cutting operations of all kinds. Oxweld Acetylene Co., 37th and Jasper Pl., Chicago, Ill. Downtown receiving station, 557-561 W. Jackson Blvd.

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ATTENTION—PATENT YOUR INVENtion. Free search and opinion. Send for inventor's Primer free. Milo B. Stevens & Co., 312 S. Dearborn St., Chicago. Established 1864. Main office, Washington.

C. L. PARKER, PATENT ATTORNEY, Formerly member Examining Corps, U. S. Patent Office, 960 G St., Washington, D. C. Pamphlet of instruction sent upon request.

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ACADEMY OF AUTOMOBILE ENGINEERing—$35 pays for complete unlimited course on automobiles. Actual repair work and road lessons daily. Best equipped school and shop in Chicago. Evening classes also. Call or write, 1454 S. Michigan Ave., Chicago.

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But if you want to learn the Automobile Construction in all its phases thoroughly, then come to the Reliable School.
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(Continued on Page 91)

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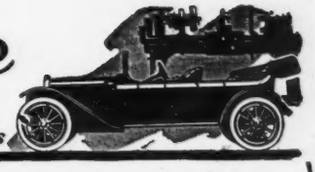
For Second-hand Shop Equipment - Used Cars - Parts and Accessories



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We are offering during the coming week some of the greatest values ever offered in the way of second-hand automobiles as well as new, guaranteed automobiles which are selling at nearly half price.

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Regular $1,390 Roadsters, 1913 Model, 36 H. P.	OUR PRICE	$875
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We also have a few fast Guy Vaughan Chasses, guaranteed for speed up to 60 M. per hour. Low, racy type. Regular price, $2,750; our price $1,250

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Abbott Detroits, 7 pass., touring, electric lights and complete equipment throughout....$1,150
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Pierce Arrow (Limousine).....$755
Peerless Roadster $650
National Roadster $700
Locomobile, 30 H. P., touring.....$1,200
Mercer, Toy Tonneau.....$650
Maxwell Touring Car.....$300
Pope-Hartford Touring $250
Cadillac Touring $375

Together with over a hundred other bargains, including Fords, Hupmobiles, Reos, Overlands, Packards, Studebakers, E. M. F., &c.

If you are contemplating rebuilding your car this fall and winter remember that we are HEADQUARTERS for axles, magnetos, carburetors, transmissions, steering gears, bodies, rumble seats, &c. In fact, everything pertaining to an automobile.

Bodies Largest stock in the world, consisting of Limousines, Coupes, Sedans, Landaulettes, all up-to-date models, never used, $100 up.

ALSO EXTENSIVE LINE OF COMMERCIAL BODIES OF EVERY DESCRIPTION, FROM $25 UP.

NEW TOPS (Touring) $25.00
(Runabout) $15.00

SEND FOR OUR GREAT **"Price Wrecker" Free**

Times Square Auto Co.

1210 Michigan Ave. Chicago **S. W. Cor. 56th St. and Broadway, New York City**

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and development of new ideas will receive our prompt attention. We have an entirely new equipment of turret lathes, broaching machines, worm and worm gear machines, lathes and other necessary tools, so that large contracts can be handled to advantage by us. Send blueprints or samples of articles you want manufactured, and we will give you figures on such articles, ready to ship.

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1204 18th Street, RACINE, WISCONSIN

Peerless Mohair Top Dressing

Waterproofs leaking mohair, duck and canvas. Makes old tops look like new.

1 gal.....$3.75 ½ gal.....$1.98
¼ gal.....$1.04

Peerless Leather Top Dressing

A renewer and preserver of all old rubber, leather and pantasote tops and curtains.

1 gal.....$3.50 ½ gal.....$ .85
½ gal.....$1.85 ⅛ gal.....$ .51

Peerless Lining Dye

Makes a uniform black lining of all faded and stained linings of tops and curtains.

1 gal.....$3.00 ¼ gal.....$ .85
½ gal.....$1.60 ⅛ gal.....$ .45

Peerless Cushion Dressing

Brightens and renews all leather seats and cushions. Will not wash or rub off. Dries in twenty minutes.

1 gal.....$3.50 ¼ gal.....$ .98
½ gal.....$1.85 ⅛ gal.....$ .51

Peerless Extra Fine Black Japan

Air drying with a high gloss finish, on all metal parts. One coat covers solid.

1 gal.....$3.75 ¼ gal.....$1.04
½ gal.....$1.98 ⅛ gal.....$ .54

Ask your dealer and jobber, or send direct to us

The Columbus Varnish Company

COLUMBUS, OHIO

Annular Ball Bearings REGROUND

We carry a complete stock of reground bearings of all makes and sizes, for immediate exchange.

Get Our Prices

Ahlberg Bearing Co.

2640 Michigan Avenue
CHICAGO, ILL.

1790 Broadway New York City **806 Woodward Ave. Detroit, Mich.**

Stop Your Tire Puncture Trouble

Just keep a little "Sure Puncture Stop" in your inner tubes and stop worrying. This is not a tire filler, but a liquid requiring from one to three pints to a tire. Automatic, instantaneous and reliable in action. Positively stops all punctures of ordinary size, stops air leaks and increases the life of your tires. It would cost you $12 to $20 to buy it. You can make it yourself at a small cost. Send $5 for formula and full directions.

TURNER-BIRDSEL COMPANY
SPRINGFIELD, OHIO

Commercial Bodies $25

All styles of delivery and truck bodies including Ambulance and Undertakers' bodies, prices starting at $25.00 each. Which is less than cost of material.

Times Square Auto Co.

56th St., Broadway, New York **1210-12 Michigan Ave., Chicago**

APCO——FORD SPECIALTIES

There Are Forty of Them

FREE CATALOG

AUTO PARTS CO. Providence, R. I.

Automobile Bodies

We have customers for all kinds of bodies. Send us list of what you have for sale. Write us for all kinds of ready stock or specially built bodies.

Paul Murray, Dealer in Automobile Bodies
518 Indiana Trust Bldg. Indianapolis, Ind.

DEALERS!

Send for our new catalogue before buying accessories. We guarantee lowest prices consistent with quality.

M. M. Sales Company

Reading, Pa.

TIRES——TIRES

All New 1913 Stock
Direct from leading tire manufacturers
WHILE THEY LAST

Size.	Casing.	Tubing.	Reliners.
28x3	$ 7.20	$1.90	$1.80
30x3	7.65	1.95	1.90
32x3	7.80	2.05	1.95
30x3½	11.00	2.70	2.60
32x3½	12.00	2.90	2.65
32x4	15.70	3.60	2.80
33x4	16.00	3.70	2.85
34x4	17.25	3.80	2.90
35x4	17.50	3.90	2.95

C. O. D. orders sent same day as received upon receipt of 10%, subject to your examination.

PARA AUTO TIRE CO.

Phone Calumet 2814
1419 MICHIGAN AVE. CHICAGO

Do You Need a Man?

If you need a superintendent, foreman, motor car mechanic or salesman, see our classified columns. If you don't find the advertisement of the man you are looking for listed there, why not insert your advertisement under the heading of "Help Wanted?" These advertisements invariably bring best results.

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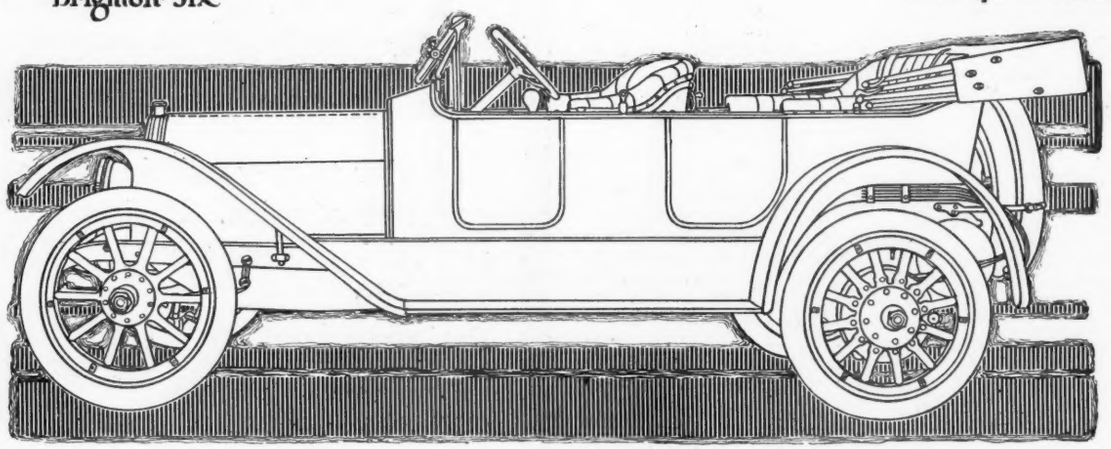
Index to Advertisements

Palmer-Singer

"Brighton-Six"

1914

Prompt Delivery



$2295, fully equipped—*Six cylinders, 45 H. P., electric starting (compressed air starting optional); electric lighting, bull's-eye sidelights flush with dash; 128-inch wheel base; 36x4½-inch tires; quick demountable rims; shock absorber on rear springs; eight day flush type keyless clock; Warner-Stewart speedometer; all gauges, dash fittings and speedometer are mounted flush with sub-dash; tire carrier in rear; clear running boards; clear-vision windshield; mohair top, curtains and boot; gasoline tank located at rear of frame, 20 gallons capacity; splash and pump lubrication; multiple jet carburetor; dual ignition; multiple disc clutch; selective transmission; extra large brakes; extra large wheel spokes, natural finish; deep upholstery; extra long springs; extremely quiet running—the cleanest looking car in the market—and "The Strongest Built Car in the World."*

Mr. Charles B. Phillips, who, on July 13, completed his trip across the continent in his *two-years-old* Palmer-Singer "Brighton-Six," on his arrival in Los Angeles, California, sent us the following unsolicited telegram:

Los Angeles, Calif.
July 13-14, 1913.

"Palmer & Singer Mfg. Co.
Completed our trip across the continent in Brighton Six last night. While the car is weatherbeaten, it is running perfectly and I know of nothing broken or out of adjustment. It never faltered in the mountains or on the desert, and no car could have landed us here with greater safety or comfort. Charles B. Phillips."

We might give page after page of mechanical data to show why, structurally, every two-year-old or any age "Brighton-Six" should make a similar trip across the continent without repairs, replacements or adjustments, and with the maximum of "safety" and "comfort" which Mr. Phillips speaks of, but,

We know you don't care for such details.

What you want to know is—

Will the 1914 "Brighton-Six" perform for you equally as well as the earlier "Brighton" models have performed for others?

It's the performance chart you want—not only as to sturdiness of construction but also as to economy of mechanical upkeep, economy of fuel and oil consumption, economy of tire wear—in fact, you want to know if the 1914 Palmer-Singer "Brighton-Six" is, all in all, the one best buy.

To begin with, we start you off with a *one year guaranty*, just four times the customary ninety-days' guaranty of most makers.

Then the price, $2,295, fully equipped, is lower first cost than other cars of similar motor, chassis and body dimensions but of less efficiency and of higher up-keep cost.

Finally, a spin in the car itself can leave no doubt in your mind.

To Dealers:

Palmer-Singer dealers are successful because they sell a successful car.

The Palmer-Singer dealership is a valuable asset—if you can qualify for appointment for your district, your success is assured.

Write today.

Palmer-Singer Manufacturing Co.

Factory, Long Island City
NEW YORK CITY

WESTERN BRANCH (Territory, Pittsburgh to Pacific Coast), 2638-40 MICHIGAN AVE., CHICAGO

A New Era—A New Opportunity

Dealers:—Are You Alive to the Latest Developments of the Electric Car Business?

ARE you one of the dealers who have said, "Some day I'll take on an electric car. But not now; I'm not ready for it?"

Or do you, perhaps, belong to those who have thought, "It's not worth while handling electrics; I can't sell enough of them?"

THE Detroit ELECTRIC

To both classes we reply, "**Now** is the time to take on an electric. For a new era has just dawned in the electric car business—an era of large production, of lower prices, of wider use for electric cars, of increased business for dealers."

Among the makers of electric cars we are the first to reach a point long since attained by some gasoline car builders—a point where our production is large enough to permit the marketing of a car of superlative quality at a medium price.

How We Bring Prices Down

Electric car prices in the past have been too high. Dealers have said it; manufacturers have known it. But no manufacturer was producing a big enough output to bring down the price.

At last we have done this. Where the average electric car builder is turning out 500 cars per year, we shall this season build from 1800 to 2000. Our volume —already more than twice that of any other electric car builder—has enabled us to adopt advanced manufacturing methods and to install high-grade equipment impossible to the maker with smaller output.

Thus we are able to offer, for the 1914 season, a selling proposition absolutely unequaled in the motor car industry today.

Opportunity's Second Call

Do you recall the early days of the gasoline car business? Perhaps at that time you had an opportunity to take on one of the cars of medium price and large production—a car that since has earned thousands of dollars for the prudent dealer who took the agency. Have you ever been sorry you were not handling that car? Have you ever regretted that you did not take it on when you had the chance?

Today you stand in a similar position with reference to the electric car business. The electric is just coming into its own. Modern improvements, in which the Detroit Electric has always led, have made it a car for town and country, for men and women, for business as well as pleasure.

Dependable, safe, clean, economical to operate, it is daily appealing to a wider and wider circle of buyers. And now, with the substantial price reductions offered by the Detroit Electric, the market is greatly extended, the sales opportunities tremendously enlarged.

A Wonderful Line

Our 1914 cars, though moderate-priced, offer a combination of desirable features never before presented in an electric car—at any price. Our line is exceptionally comprehensive. Two chassis models are offered—a worm gear type and a bevel gear type. Seven different body styles are furnished. Choice is offered of front seat drive, rear seat drive, or Detroit Duplex drive, operating from either seat.

The striking features of our 1914 models include Detroit Electric clear vision bodies, Hanlon patented double-glass rain vision window, full aluminum body panels and roof, full skirted aluminum oval crowned fenders, electric hand brake, Detroit Electric Shaft Drive (chainless), extra large tires, increased battery capacity, superfine upholstery, Warner speedometer, high-grade clock, and many minor details in construction and equipment.

Now Is the Time To Act

Here is a real opportunity to repeat the success of the gasoline car industry. Here is a chance to get into a branch of the motor car business which presents the greatest possibilities of growth and profit.

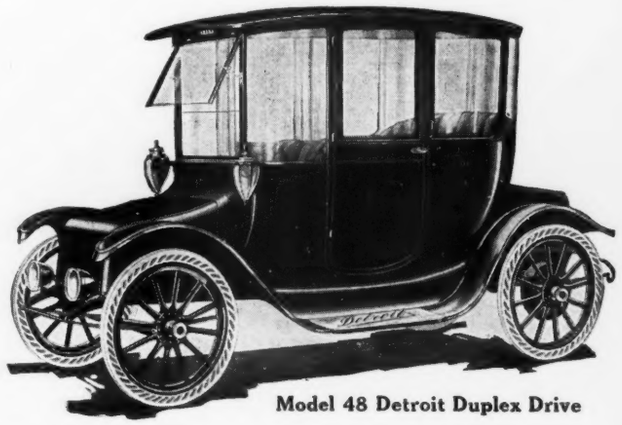
If you are a gasoline car dealer and want to add to your sales and profits, write us now and find out if your territory is still open. If you are already an electric car dealer and want to increase your business, to make sales faster and easier, get in touch with us.

And remember—that in taking on the Detroit Electric agency you are tying up with the largest makers of electric pleasure vehicles in the world, with a solid, substantial company, amply financed and soundly managed.

Literature and dealer's proposition on request.

Anderson Electric Car Co.

Detroit, Michigan



Model 48 Detroit Duplex Drive

With Worm Gear Axle		With Bevel Gear Axle	
5-pass. Brougham, Detroit Duplex Drive	$3000	5-pass. Brougham, Front Seat Drive	$2800
4-pass. Brougham, Rear Seat Drive	2850	4-pass. Brougham, Rear Seat Drive	2550
Gentleman's Roadster	2500	Victoria	2300

F. O. B. DETROIT